

2. On a Collection of Mammals from the Coast and Islands of South-East Siam. By G. BODEN KLOSS, F.Z.S., F.R.G.S. With an Account of the Fruit-Bats, by Dr. KNUD ANDERSEN, F.Z.S.

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(Plate I.\* and Text-figures 1, 2.)

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Towards the end of 1914 I went on short leave to Siam with three Dyak assistants, my object being zoological collecting in the extreme south-east of the country, and having reached Chantabun by steamer *via* Bangkok, I hired a small native sailing-vessel ("rua pet") and passed six weeks cruising and camping on the coast and islands beyond (see Pl. I.), getting in altogether about thirty-three working days. The result was a set of rather over 500 mammals, 300 birds, and 250 reptiles and batrachians.

Mammals were the principal object of the excursion, and I chose this district of the mainland because very little investigation of it had taken place, while the islands were quite untouched; for although Captain Stanley Flower appears to have been in Chantabun in 1898 (P. Z. S. 1900), no other naturalist has followed Mouhot, whose collections were reported on by Gray and Günther in the 'Proceedings' of 1859 and 1861.

In recent years Mr. T. H. Lyle has sent home specimens

\* For explanation of the Plate see p. 66.

from the better-known parts of Siam—the basin of the Menam and its head-waters near Chiangmai and Nan (*cf.* Bonhote, P. Z. S. 1900, 1901, 1902); and the ornithologist Count Nils Gyldenstolpe, of the Royal Swedish Museum, has lately collected mammals in much the same area and also in the province of Korat (*cf.* Gyldenstolpe, *Arkiv för Zoologi*, Stockholm, 1914); but still the remote south-east has remained unvisited, nor can I find that its French possessors have carried out any investigations in the adjacent parts of Cambodia. So to the zoologist the region between Cochin-China and the better-known districts of Siam was largely a no-man's-land.

The mainland visited requires no description; it is undulating coastal country, covered with forest except round villages, and with mountains in the distance. Lem Ngop \* lies on the north shore of Koh Chang † Strait, and Ok Yam (or Jam) is eastward of Koh Kut, just within French territory, as the present boundary of Cambodia comes out on the coast half a mile to the west of it (lat.  $11^{\circ} 40' N.$ ). Klong Yai ‡ and Klong Menao are estuaries to the north of Ok Yam.

Of the islands, Koh Chang is about 15 miles long and 7 wide; it is very hilly, and its highest peak, one of a number, rises to 2446 ft. The strait which separates it from the mainland narrows in part to 3 miles, though, since much of the adjoining province is an alluvial plain, the island was probably at one time more isolated. It is the northernmost of the Chantabun Archipelago.

The two little islands of Mehsi (935 ft. high) lie close together, two miles off the south-east end of Koh Chang; they are called on the chart (Admiralty 2721) "Ile du Pic" and "Le Chameau" respectively. A little farther from the southern shore lie Koh Klun (600 ft.) and Koh Kra (800 ft.).

Koh Kut, 15 miles S.S.E. of Koh Chang and about 18 miles from the Siamese-Cambodian coast, is the southernmost of the group; it is some 13 miles long and 5 wide, elevated, with a peak of 1171 ft. It is uninhabited, but swarms with ticks, which infest every animal upon it and made our week's residence there a most uncomfortable experience.

Between the northern islands and Koh Kut, from east to west, are Koh Mak and Koh Rang (800 ft.), the first the larger, being about 4 miles long, but, except for one small hill, very low. Three miles or so west of it is Koh Rang (Koh Loi of the chart), the most seaward of the group, and, like the other smaller islands, a little under two miles long. There are, further, a few little islets which I did not visit.

Koh Chang and the Mehsi Islands are separated from the mainland by depths of between 3 and 4 fathoms; Kra, Klun, and Mak rise from 6 to 7 fathoms of water; Koh Kut stands in 9 to 10 fathoms, and Koh Rang is on the 12-fathom contour-

\* Lem=Cape.

† Koh=Island.

‡ Klong=River.

line. All are covered with dense evergreen tropical forest, and Koh Chang and Koh Mak alone are inhabited.

The only terrestrial mammals on the smaller islands are forms of *Epimys surifer* and *E. rattus*. Koh Melisi, though nearer the mainland, higher, and in shallower water, has a form of the latter only.

Koh Chang and Koh Kut vary in the composition of their faunas, for while the former lacks a *Ratufa*, a species which occurs on Koh Kut, the latter is without any *Presbytis*, *Tupaia*, or *rattus* rat, all of which are found on the larger island. On both a form of *Epimys jerdoni* is very common, though it was not met with on the mainland.

When we got back to Bangkok visits were paid to Koh Si and Koh Phai in the Inner Gulf, and accounts of the collections made on them and of the reptiles and batrachians obtained in the south-east appear in the 'Journal' of the Natural History Society of Siam, while a report on the birds is contributed to 'The Ibis.'

The first set of all collections has been given to the British Museum (Nat. Hist.) at South Kensington, and the second to the U.S. National Museum at Washington.

Ridgway's colour-names used here are those of his second publication, 'Colour Standards and Nomenclature,' 1912

Though in the title of this paper I have mentioned only one locality for the sake of brevity, it may be said that most of the specimens obtained at Ok Yam and many from Klong Yai actually came from the Cambodian side of the boundary, as it now runs between Siam and that country.

# 1. HYLOBATES PILEATUS Gray.

*Hylobates pileatus* Gray, P. Z. S. 1861, p. 135, pl. xxi.; de Pou-sargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 511 et seq. (1904).

*Hylobates agilis*, variety *pileatus* Flower, P. Z. S. 1900, p. 313.

5 adult males, 2 adult females, 1 female juv., from Klong Menao and Len Ngop, S.E. Siam.

It is probable that these animals are practically topotypes, as Mouhot's specimens came from some part of Cambodia. The statement that they were met with on a small island near the coast must be received with hesitation until their occurrence in an insular locality is confirmed.

The original description of the species applies excellently to the present series of this individually variable genus. The five males are (though paler on the dorsal region and the lower half of the legs) black or brownish black throughout except for a ring round the face, the hands and feet, and a genital tuft, which are dull white or buffy-white. The pale band running from the temples round the back of the head, greyish, ashy or brownish posteriorly, is not always complete behind, and then the dark

patch on the crown (which gives its name to the species) is not always isolated. The pale area on the hands and feet varies in extent; sometimes it covers the extremities from the wrists and ankles and sometimes is confined to the fingers and toes.

The two adult females are drab above, the rump and outer side of limbs somewhat warmer in tone, being slightly tinged with ochraceous. The crown, cheeks, throat, and a diamond- or shield-shaped area over the breast and abdomen extending to the axillæ and almost to the genital region are blackish. The hands and feet, inner side of limbs, and the pelage bordering the black areas are somewhat lighter than the rest of the body.

The young female is drab to buffy throughout except for a slightly indicated dark cap on the top of the head.

Gray was only able to state that the pale examples examined by him were "probably female." I was told by Siamese villagers who saw my specimens that females were always pale on the back and limbs, while the abdominal surface is variable (*cf.* de Pousargues, *op. cit.* p. 516).

I am of opinion that this animal should be given only sub-specific rank and treated as a geographical race of *H. lar*, which occurs as far east as Luang Prabang (de Pousargues, *op. cit.* p. 511) and in Central Siam, east of the Menam (Gyldenstolpe, *Arkiv för Zoologi*, Band 8, no. 23, p. 6, 1914).

Though I only obtained these animals at two collecting-stations, we heard them calling every morning from the hills all along the coast from Ok Yam on the Franco-Siamese boundary to the mouth of the Ban Yao River near Chantabun. Their cry did not appear to differ in any way from that of *H. lar* or *H. agilis*.

*Measurements.*—See table, p. 67.

## 2. *MACACA ANDAMANENSIS* Bartlett.

*Macaca andamanensis* Bartlett, Land and Water, vol. viii. p. 57 (1869); Schater, P. Z. S. 1869, p. 467 & figure.

*Macaca leoninus* Schater, P. Z. S. 1870, p. 663, pl. xxxv.; *id.*, *op. cit.* 1898, p. 280; de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 517 (1904).

A single adult female of this species was obtained at Klong Menao. This sex does not appear to have been fully described, so that an account of the present specimen may not be out of place.

*Colour.*—Crown, nape, and entire upper surface, outer side of forearms, hands, and feet mummy-brown to olive-brown, slightly lighter and yellower across the shoulders and lighter on the upper part of forearms and on the sides, the hairs annulated with dull pale buff. Thighs and buttocks paler and greyer (near drab-grey), devoid of annulations, the hips somewhat more buffy. Face, temples, sides of head and neck, and buttocks buffy-silvery or dirty brownish white, underside of body and inner side of arms more silvery. Tail mummy-brown below, blackish brown



above, this colour not continued on to the rump, which is scarcely perceptibly darkened mesially. Inner side of ears silvery, a few dark hairs round the eyes. Skin of orbital region in living animal pale lilac-blue; nose, lips, palms, and soles fleshy brown.

Comparison with females of *M. nemestrina* from the Malay Peninsula shows that the female *andamanensis* differs in the absence of any rufous or ochraceous tone in the pelage and in its undarkened rump: while, as regards the skull, the muzzle is much reduced in size and tapers both upwards and forwards and the interpterygoid space is wider, embracing laterally a greater portion of the bullæ.

Considering the individual variability of macaques, the dimensions of the skull are in strikingly close agreement with those of the female recorded by Anderson in 'Zoological Researches,' p. 52, which probably came from the country west of the Irawadi River.

*Measurements.*—External measurements, taken in the flesh: total length, 640 mm.; tail from angle formed with rump above, 200; head to vent, 480; hind foot, 158; ear, 38. Skull: greatest length, 117·5 (113·8); basal length, 77·7 (79·2); palate to foramen magnum, 32 (34·5); anterior edge of auditory opening to gnathion, 86·2 (81·2); occiput to nasion, 85 (87·6); nasion to gnathion, 49·3 (51·7); orbit to gnathion, 39; breadth of muzzle at pm<sup>1</sup> 30·5 (30·4), at m<sup>3</sup> 35·6 (34·3), at roots of zygomatica 40; facial breadth at fronto-malar suture, 61 (62); post-orbital breadth, 47·6 (48·2); zygomatic breadth, 77 (76); mastoid breadth, 64 (62·7); orbit, 25 × 25·5 (24 × 28); maxillary tooth-row exclusive of incisors, 38; length of mandible in alveolar plane, 77 (75).

Elliot has pointed out ('Review of the Primates,' vol. ii. p. 209) that Blyth's name for this monkey is preoccupied by *leonina* Shaw, applied to *M. albibarbatus*, so that *andamanensis* Bartlett, based on an example introduced into the Andamans from Burma, must unfortunately be used.

### 3. MACACA IRUS Cuvier.

*Macacus irus* F. Cuv. Mém. Mus. Hist. Nat. Paris, iv. 1818, p. 120.

*Macacus cynomolgus* Flower, P. Z. S. 1900, p. 316; de Pou-sargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 517 (1904).

*Pithecus fascicularis* Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 3 (1914).

3 adult males, 2 adult females, 1 immature female, from Koh Kut Id., S.E. Siam.

3 immature females, from Koh Chang Id., S.E. Siam.

I have compared these animals with a large number from the Malay Peninsula and adjacent islands which show a great

amount of individual variation from each locality. The only difference I can detect is that, series for series, the Siamese animals have perhaps a somewhat greater quantity of black hairs on the forehead and top of head, but the distinction is unimportant, and I have therefore placed them under the name first definitely applied to the crab-eating monkey of the S.E. Asiatic mainland.

It may be said that the blackish hands and feet which Elliot ('Review of the Primates,' vol. ii. pp. 189, 230, 231, 233 (1913)) emphasizes as the distinguishing characters of *M. irus* do not, so far as my experience goes, exist.

On the whole the series is very uniform, save that adult females have no trace of rufous on the dorsal surface.

We met with a large herd of these monkeys on the mainland on one occasion while sailing up a river at daybreak, but were not prepared for obtaining them.

*Measurements*.—See table, p. 67.

#### 4. PRESBYTIS GERMAINI M.-E.

*Semnopithecus germani* Milne-Edwards, Bull. Soc. Philom. 1876, Feb. 12; Flower, P. Z. S. 1900, p. 319; de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 517 (1904) (mis-spelt *germani*).

*Presbytis germani* Gyldenstolpe, Arkiv för Zoologi, Stockholm, Band 8, No. 23, p. 5 (1914).

One adult male of this handsome silvery-black leaf-monkey was obtained at Klong Yai, S.E. Siam, where, and in Cambodia and Cochín-China, it is the representative of the *cristata* group.

*Measurements*.—See table, p. 67; and also under *P. g. mandibularis*.

#### 5. PRESBYTIS GERMAINI MANDIBULARIS, subsp. n.

*Type*. Adult male (skin and skull), No. 1433/C.B.K. B.M. No. 15.11.4.5. Collected on Koh Chang Id., S.E. Siam, 7th December, 1914.

*Characters*.—A form of *P. germani* characterised by smaller size, paler legs, more slender zygomata, broader interpterygoid space and basioccipital, and by the higher and narrower ascending ramus of the mandible.

*Colour*.—Resembles *P. germani*, except that whereas in the mainland animal the buttocks, outer and posterior sides of legs are pure silvery white, sharply contrasting with the black feet and back, in the island form these areas are black or greyish, only frosted with silver, and thus less contrasting with the feet and back.

*Skull and Teeth*.—As compared with an adult but less aged male from the mainland, the skull is smaller; the zygomatic arches much less deep (4:7 mm.), the lower edge being concave instead of straight; the basioccipital is relatively broader; the interpterygoid space broader and more oblique, the sides more spread

out, and the tips of the pterygoids farther apart (36 : 33 mm.). The ascending ramus of the mandible is steeper, being both higher and narrower, with the sigmoid notch less broad; a line passing down the back of the condyle and angle of the mandible is almost perpendicular to the plane of the base of the mandible in *P. germaini*, while in its subspecies, at their junction, these planes form an acute angle only.

*Measurements*\*.—External measurements, taken in the flesh: total length, 1260 (1300) mm.; tail from angle formed with rump above, 720 (755); head to vent, 540 (570); hind foot, 160 (160); ear, 40 (42). Skull: greatest length, 99.5 (106); basal length, 72.5 (80); zygomatic breadth, 77 (78); maxillary tooth-row, 35 (36); greatest length of mandible, 73 (81); perpendicular height of coronoid process, 47 (44); perpendicular height of condyle, 44 (42); breadth of ascending ramus from anterior root opposite centre of  $m_2$  to angle, 32 (34); coronoid process to back of condyle mesially, 16 (18.5).

*Specimens examined*.—Seven (the type, 3 adult females, 2 immature females, 1 male juv.)†.

*Remarks*.—Though, as listed above, I have only one adult male from the mainland for comparative purposes, I have regarded it as a typical example, and while the above details record differences between it and the insular male, the characters of the latter are completely confirmed by the remainder of the series from Koh Chang.

The colour of the infant male is ochraceous orange above, ochraceous buff below, with traces of darkening on forehead, temples, and tip of tail.

The two immature females, both partially retaining their milk-dentition, resemble adults in every respect in colour of pelage. No form of *Presbytis* occurs on the neighbouring large island, Koh Kut.

#### 6. PARADOXURUS HERMAPHRODITUS Pall.

*Viverra hermaphrodita* Pallas, Schreber, Säugeth. iii. p. 426 (1778).

*Paradoxurus pallasii* Gray, P. Z. S. 1861, p. 136.

*Paradoxurus hermaphroditus* Flower, P. Z. S. 1900, p. 329; de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 522 (1904).

A half-grown female was obtained on Koh Chang Id. which differs from *P. m. kutensis* in its lighter, more buffy colour, narrower stripes, and paler shoulders; the muzzle and extremities are less black, and the chest is darker; a broad pale band extends uninterruptedly across the forehead, much reducing the brownish area on the top of the head. Save for this latter, it appears to bear some likeness to *P. cochinchensis* of Cochin-China (Schwarz,

\* Measurements in parentheses those of an adult male from the adjacent mainland, No. 1839, C.B.K.

† See table, p. 67.

Ann. & Mag. Nat. Hist. ser. 8, vol. vii. p. 635, 1911), but it also exactly resembles externally a specimen from the State of Perlis, in the Malay Peninsula, and others from islands north of Penang. The skull is too young for comparison.

7. *PARADOXURUS MINOR KUTENSIS*, subsp. n.

*Type*. Adult male (skin and skull), No. 1749/C.B.K. B.M. No. 15.11.4.39. Collected on Koh Kut Id., S.E. Siam, 27th December, 1914.

*Characters*.—A race of *P. minor* Bonhote ('Fasciculi Malayenses,' Zoology, Part 1, p. 9, 1903), characterised by blacker (less brownish) muzzle, crown, tail, and extremities, less fulvous fur above, paler nape and chest, the latter concolorous with the rest of the buffy abdomen, by the great breadth across the zygomata, and by smaller bullæ.

*Colour*.—Muzzle, chin and throat, top of head and ears, distal half of fore and hind limbs extending higher on under surface, and greater part of tail brownish black. Five black stripes or rows of spots on the back and a few on the flanks, the inner three extending on to the base of the tail and becoming somewhat broken and irregular on the shoulders, which, with the neck, are somewhat clouded with blackish. A few black spots on sides and thighs. General ground-colour of the body, extending to the throat below and over the neck above, pale smoke-grey, slightly tinged with buff on the rump and thighs. A broad whitish band from above the eyes passes below the ears to the sides of the neck, but is interrupted on the forehead, where the black area of the muzzle is connected with that of the crown. Base of tail pale fulvous clouded with longer black-tipped hairs.

*Skull and Teeth*.—The skull agrees with those of *P. minor*, from Peninsular Siam, but is rather larger, the zygomatic breadth in particular being greater. The bullæ, on the other hand, are considerably smaller. The teeth also are in general agreement, but there is a greater deflection in the maxillary row owing to the fact that the posterior cusp of *m*<sup>1</sup> is placed much nearer the centre of that tooth.

*Measurements* \*.—External measurements, taken in the flesh : total length, 480 (460) mm.; tail, 420 (450); hind foot, 74 (64); ear, 40 (39). Skull : greatest length, 101 (96); basal length, 90; length of palate, 45 (43); breadth of palate between carnassials, 16 (14); greatest breadth of brain-case, 35.5 (32); zygomatic breadth, 58.5 (53); intertemporal constriction, 13; length of maxillary tooth-row, exclusive of incisors, 37.

*Specimens examined*.—The type and a half-grown female with exactly similar coloration.

*Remarks*.—Its rather larger size, paler, less fulvous ground-colour, smaller bullæ, and broader skull serve to distinguish this animal from *P. minor* of the type-region; in addition, the tooth-

\* Measurements in parentheses those of the type of *P. minor*, an adult female from Jalor, Peninsular Siam.



row is a little more deflected. This latter character, apart from smaller size, may serve to separate the *minor* from the *hermaphroditus* section, in which the maxillary tooth-row is less bent, since the outer lobes of *m*<sup>1</sup> are more in line. In the Koh Kut animal the great breadth of the skull near the posterior roots of the zygomata causes it to have a very heart- or pear-shaped outline.

The only examples of *P. minor* hitherto recorded from Indo-China are two young individuals collected by Dr. Vassal in Annam (Bonhote, P. Z. S. 1907, vol. i. p. 6).

8. *MARTES FLAVIGULA INDOCHINENSIS*, subsp. n.

*Martes flavigula* de Ponsargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 521 (1904)?

*Type.* Adult female (skin and skull), No. 1860/C.B.K. B.M. 15.11.4.40. Collected at Klong Menao, S.E. Siam, on 9th January, 1915.

*Characters.*—Closely resembling in colour *Martes flavigula*, but considerably smaller, with naked soles, harsh fur, and broad-lobed posterior molar, agreeing in these respects with the equatorial members of the group.

*Colour.*—Entire upper surface of head and neck to shoulders, including ears, hind feet, and tail, deep brownish black; distal half of fore legs, rump, base of tail, and hind limbs blackish brown, these colours gradually changing into honey-yellow between the shoulders and hind quarters, the median dorsal line being washed throughout with mummy-brown, most strongly posteriorly. Sides of neck between ears and shoulders bright buff-yellow; sides of upper lip, chin, and throat white; under-side of neck and fore-chest dirty white tinged with yellow; chest and abdomen cartridge-buff. Inner sides of ears mummy-brown edged with whitish and with an indistinct central patch of the same colour.

*Skull and Teeth.*—Do not appear to differ from those of *M. f. peninsularis* Bonhote (8 specimens examined), except that the skull is a trifle larger and the bullæ a little larger and more dilated.

*Measurements* \*.—External measurements, taken in the flesh: head and body, 480 (430) mm.; tail, 385 (383); hind foot, 96 (85); ear, 38 (32). Skull: greatest length, 91 (90); basal length, 85.5 (83.5); length of palate from henselion, 42 (41); least palatal breadth between carnassials, 13.5 (15); breadth at post-orbital constriction, 24.5 (21.5); zygomatic breadth, 51 (49.5).

*Specimens examined.*—One, the type.

*Remarks.*—In colour this animal seems closely to resemble *M. f. flavigula*, ranging from Nepal to Burma, but its naked soles, short harsh fur, small size, and broad inner lobe of the posterior molar place it in the equatorial section of the group

\* Measurements in parentheses those of an adult female *M. f. peninsularis* from Trang, Peninsular Siam: F. M. S. Mus. No. 1142/10.

and separate it from the true *M. flavigula* according to Mr. J. L. Bonhote in Ann. & Mag. Nat. Hist. ser. 7, vol. xii. p. 342 *et seq.* (1901), who there reviewed the group.

Since writing the above paper Mr. Bonhote has recorded two examples of the true *M. f. flavigula* from Chiangmai, Northern Siam (P. Z. S. 1902, part i. p. 38), thus increasing the range of this form. These examples are much larger than the individual under discussion here, so that it would appear that there are in Siam two races similar in colour but differing in size and in the characters given above. Were it not for these latter it would be most convenient to regard the south-eastern animal simply as a small race of *M. flavigula*.

#### 9. TUPAIA CONCOLOR Bonhote.

*Tupaia concolor* Bonhote, Abstract P. Z. S. 1907, p. 2; id., P. Z. S. 1907, p. 7; Lyon, Proc. U.S. Nat. Mus. vol. xlv. p. 59 (1913).

*Tupaia belangeri* de Ponsargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 520 (1904); Gyldenstolpe (partim), Arkiv för Zoologi, Band 8, No. 23, p. 9 (1914).

2 males, 2 females, Ok Yam, Franco-Siamese Boundary; 3 males, 5 females, Klong Yai; 2 males, 2 females, Klong Menao, S.E. Siam.

These animals are intermediate between *T. belangeri* Schreb., of Pegu and Tenasserim, and *T. concolor* Bonhote, known from Southern Annam and Cochin-China. On the whole, however, they most closely approximate to the latter, though the pale shoulder-stripe is perhaps a little more marked, and so I have assigned them to it on geographic grounds. Several of them which are faintly washed on the rump with ochraceous, nearly resemble examples of *T. belangeri* from Southern Tenasserim, but the annulations anteriorly are somewhat coarser, while the buff is of a slightly deeper shade. There are three pairs of mammae as in *T. belangeri*; in *T. concolor* the number is unfortunately unknown, as are the external measurements. The present animals are somewhat larger than *T. belangeri*, while the dimensions of the skulls are similar to those of skulls from Annam and Cochin-China.

*Measurements*.—Ears of the series, 15–20 mm. For other measurements see table, p. 68.

#### 10. TUPAIA CONCOLOR SINUS, subsp. n.

*Type*. Adult male (skin and skull), No. 1422/C.B.K. B.M. No. 15.11.4.31. Collected on Koh Chang Id., S.E. Siam, 7th December, 1914.

*Characters*.—Like *T. concolor*, from the adjacent mainland, but smaller, darker, with yellower under surface and a conspicuous shoulder-stripe.

*Colour*.—Entire upper surface a grizzle of ochraceous buff and

blackish, the crown more ochraceous, the tail blacker, and the sides and limbs more buffy, but no difference in tone between the shoulders and rump; shoulder-stripe conspicuous cream-buff. Chin, throat, chest, and median abdomen buff-yellow; underside of thighs buffy-grey, of fore limbs buffy. Hairs of tail below with two distinct buffy annulations and a narrow subterminal one slightly deeper in shade. Ears dark.

*Skull and Teeth*.—Do not differ from *T. concolor* except in size.

*Measurements*.—Ears of the series, 15–18 mm. For other measurements see table, p. 68.

*Specimens examined*.—Seven, 4 males and 3 females, from the type-locality.

*Remarks*.—Only one island race of *Tupaia*, the present form, was met with during the excursion, the family being unrepresented on the large island of Koh Kut. *T. c. sinus* is a well-marked insular race, clearly differentiated by smaller size, concolorous dorsal area, and conspicuous shoulder-stripe.

# 11. DENDROGALE FRENATA Gray.

*Tupaia frenata* Gray, Ann. & Mag. Nat. Hist. ser. 3, vol. vi. p. 217 (1860).

*Dendrogale frenata* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 520 (1904); Bonhote, P. Z. S. 1907, p. 8; Lyon, Proc. U.S. Nat. Mus. vol. xlv. p. 128 (1913).

1 male, 1 female, Klong Menao; 1 female, Klong Yai, S.E. Siam.

Recently Dr. M. W. Lyon has so carefully characterised this species in his monograph on the Tupaiidæ (*loc. cit. supra*), that there is little more to add. His description, however, apparently applies to the female, as the two examples of that sex now obtained most closely agree with it, while the male is both larger and of richer colouring, with darker tail, the upper surface of the body being more tawny, the under surface of a richer buff, while the bright areas of the head are buff-yellow (*Ridgway* 1912). These differences have not hitherto been properly allocated, as the sex of the few specimens previously collected was unknown.

With regard to the head-markings, it may be further noted:—The black line through the eye is continued over the inner side of the ear, and the buffy cheek-colour runs round the lower edge of the ear to the back of this. There occurs also below the eye a narrow black line running from the upper lip to the roots of the cheek-vibrissæ. The buff of the thigh continues along the outer side of the foot and spreads over part of its upper surface, while the toes are largely buffy.

Dr. Lyon remarks of this and the allied *D. murina* from Western Borneo, that their scarcity in collections may probably be due to some peculiarity of habit making them difficult to

secure. My experience of *D. frenata* is that it does not come to traps, as do other Tupaiidæ. It runs about on the ground or along the roots of large trees, and being an extremely shy and inconspicuous little animal, is not easy to see or to shoot.

*Measurements.*—Ears of the series, 12–13 mm. For other measurements see table, p. 69.

12. *PTEROPUS HYPOMELANUS CONDORENSIS* Pet.

1602. ♀ ad. Koh Mak. 19th December, 1914.

1628. ♀ juv.; 1629. ♀ subad.; 1630. ♀ subad. Koh Mak. 20th December, 1914.

1656. ♂ ad.; 1657. ♂ ad.; 1658. ♂ subad. Koh Rang. 21st December, 1914.

“In the three fully adult specimens, one from Koh Mak and two from Koh Rang, the forearm measures 138–142 mm., the skull (total length) 62–67, the lower jaw (condyle to front of incisors) 49·8–53·5, and the maxillary tooth-row ( $c^1-m^2$ , crowns) 24–25·5.

“Though not very large, this series beautifully illustrates the individual colour-variations in this bat. I should not be surprised if they represent approximately the extremes in colour, besides, of course, several intermediate stages. The mantle varies from a tinge a little paler than “hazel” (Ridgway, pl. iv. no. 12\* : ♂ subad., Koh Rang, 1658), through several darker tinges, to warm glossy seal-brown (pl. iii. no. 1 : ♀ ad., Koh Mak, 1602). The underparts are, in two individuals (♀ juv., Koh Mak, 1628, and ♂ ad., Koh Rang, 1656), quite or very nearly uniform dull seal-brown; in one (♀ ad., Koh Mak, 1602) there is just a faint suggestion of a deep chocolate tinge in the central area of the breast and belly, in others this same area becomes gradually lighter in colour, the extreme being a quite pale shade of russet (considerably paler and more buffy than Ridgway’s pl. iii. no. 16 : ♀ subad., Koh Mak, 1629). The back varies from blackish seal-brown to a tinge almost like ‘burnt umber,’ and is sometimes nearly uniform, but more often thinly, sometimes rather thickly, sprinkled with greyish hairs.

“The variations as described above are entirely independent of the sex and age of the individuals.

“These are the first specimens of *condorensis* I have seen since working out the genus *Pteropus* for the British Museum Catalogue of Chiroptera. My material then was the type in Berlin and the paratypes in Paris, from Pulo Condor (off S.E. Lower Cochin-China), all of which are mounted and faded, and an old and much faded skin in the British Museum labelled ‘Siam’ (Finlayson). Judging from the present fresh and well-preserved series, I am inclined to think that *condorensis* will have to be put down as a synonym of *Pt. hypomelanus tomesi*.

\* The colours in my ‘Catalogue of Megachiroptera’ were named from the old edition of Ridgway’s ‘Nomenclature of Colours’ (1886). To avoid confusion I use the same book for my description of the colours here.



But before giving any definite opinion I should like to see fresh material from Pulo Condor.”—*Knud Andersen*.

[Bats of the *hypomelanus* species are apparently strictly confined to small islands, and do not occur on the mainland or on large islands, however closely their homes may be situated to such regions.

The *vampyrus* species, on the other hand, is largely of continental habitat, or, if living on islands, the animals are of greater size and more nearly related to the mainland forms than are those of the *hypomelanus* species; and except on one of the Natuna Islands, representatives of the two species never seem to occur side by side.—*C. B. K.*]

### 13. PTEROPUS VAMPYRUS MALACCENSIS K. AND.

1671. ♀ juv.; 1672. ♂ ad.; 1673. ♂ ad.; 1674. ♀ ad. Koh Kut. 23rd December, 1914.

1690. ♂ ad. Koh Kut. 24th December, 1914.

1732. ♀ subad.; 1748. ♂ subad. Koh Kut. 26th December, 1914.

“No. 1671 is not nearly full-grown. No. 1732 is perhaps externally full-sized, and the skull very nearly so.

“In the four fully adult specimens the forearm varies between 190–204 mm. (this lowers the minimum given in my Catalogue by 5 mm., but it is easy to see that my material did not show the real extremes in size; the then available measurements of the forearm were 195–209, but as the variation in length of forearm in any species or subspecies of *Pteropus* is usually at least ten per cent., 190–209 comes probably nearer the true extremes); the skull (total length) measures 77·5–81, the lower jaw (from condyle) 60·5–64, and the maxillary tooth-row (crowns) 30–30·7.

“The six specimens are not peculiar in any respect. In colour they exhibit no more variation than usual in *Pt. v. malaccensis*, i. e. a lighter or deeper tinge of the mantle and head, and a thinner or heavier admixture of greyish hairs on back and underparts.

“*Pt. v. malaccensis* was known to be generally distributed over Sumatra, including Banka and the Linga Archipelago, and northwards through the Malay Peninsula to Jalor and Patani. The present series extends its range across the Gulf of Siam to the island of Koh Kut, off S.E. Siam.

“Three years ago, in the new British Museum Catalogue of Chiroptera (vol. i. p. 325, in the paragraph ‘Differentiation of species’) I hinted at the possibility that a completed material might show a gradual transition from *Pt. giganteus* (‘*Pt. medius*’ of Dobson’s Catalogue) to *Pt. vampyrus* (‘*Pt. edulis*’). But time was not ripe then for any final conclusion on this subject, and I preferred, in order not to prejudice matters, simply to record the distinguishable forms under four headings:—

“(1) *Pt. giganteus* (two races) from India and Ceylon, north and north-east to Nepal, Assam, and Manipur—represented in the

Maldive Archipelago by (2) *Pt. ariel*, in Tenasserim by (3) *Pt. intermedius*, and in the Malay Peninsula and Indo-Malayan Archipelago by (4) *Pt. vampyrus* (six races). A fifth form, *Pt. lylei* (Siam and Saigon) appears to be a perfectly distinct species.

"Since then the Mammal Survey of India, carried out under the auspices of the Bombay Natural History Society, has enormously increased our knowledge of the range of variation of *Pt. giganteus*, and everything I have seen so far tends to confirm my belief that future systematists will be compelled to regard *giganteus*, *ariel*, *intermedius*, and *vampyrus* as local representatives ('subspecies') of one species, *Pt. vampyrus*—*intermedius* being (as the technical name was intended by me to indicate), both geographically and in its characters, the connecting-link between the western (Indian and Indo-Chinese) *giganteus* and the eastern (Indo-Malayan) *vampyrus*, and *ariel*, an only slightly and probably imperfectly differentiated island form of *giganteus*."—*Knud Andersen*.

[The occurrence of this animal on Koh Kut is interesting, as it must apparently have arrived there by flight from the Malay Peninsula across the Gulf of Siam—a journey over water of about 250 miles—since the only flying-fox known on the mainland from Bangkok to Siam is *P. lylei*, a very distinct species, while the continent west of Bangkok is apparently occupied by another species, *P. intermedius*.—*C. B. K.*]

14. *CYNOPTERUS BRACHYOTIS ANGULATUS* Miller.

15. *CYNOPTERUS BRACHYOTIS BRACHYOTIS* S. Müller.

1437–1440, All ♂ ad. Koh Chang. 7th December, 1914.

1508. ♂ ad. Koh Mehsi East. 13th December, 1914.

1579. ♂ ad.; 1580. ♂ ad.; 1581. ♀ ad.; 1582. ♀ ad.; 1583. ♀ ad. Koh Kra. 17th December, 1914.

1599. ♂ ad.; 1600. ♀ subad.; 1601. ♀ ad. Koh Klum. 18th December, 1914.

1786. ♂ ad. Koh Kut. 30th December, 1914.

"The four specimens from Koh Chang I refer to *C. b. angulatus*; all the others are undoubtedly *C. b. brachyotis*.

"I have carefully examined and measured all the specimens. Unfortunately, all being skins\*, I have been unable to verify the collector's measurements of the ears, as given on the label of each specimen. Not that I have the slightest doubt of the accuracy of his measurements, but what I do have is a strong

\* I should like to take this opportunity of urging on collectors the advisability of preserving in alcohol a fairly good number of the bats obtained. Skins are indispensable for a study of the colours of the fur, but the shape and size of the ears and (in leaf-nosed bats) the details of the nose-leaves are in this group of mammals such important items that I often, during my work for the Catalogue, have had to deplore the now almost universal habit of experienced collectors of making nearly every good specimen of a bat into a skin. My earnest advice is, if only one specimen is obtained, put it in alcohol, if several, put about half of them (and not only the most badly damaged ones) in alcohol.—*K. A.*

suspicion that his method of measuring the ears of a *Cynopterus* is different from mine, and his measurements, therefore, not directly comparable with those given by me in the new 'Catalogue of Chiroptera.' If they were, then the four specimens from Kōn Chang, though having a cranial rostrum perfectly similar to that of *C. b. angulatus*, would possess ears as long as, or (in three out of four cases) conspicuously longer than, any *C. sphinx sphinx* I have seen. It is only natural, I think, that before admitting the existence of such specimens I should like to verify their characters on alcohol material. Also the 'collector's measurements' of the ears of the ten *C. b. brachyotis* are unusually large.

"In the specimens of *brachyotis* the forearm measures 58-66 mm. (57-66: I add everywhere in parentheses, for comparison, the corresponding measurements taken by me on the large series examined for the 'Catalogue of Chiroptera'), in the four *angulatus* 66-70 (65-72); ear, collector's measurements, *brachyotis* '15.5-18' (15-17), *angulatus* '18.3-21' (16-18); skull, lambda to gnathion, *brachyotis* 28.5-29.8 (27-30.7), *angulatus* 32-33 (30.5-33.2); rostrum, orbit to nares, *brachyotis* 6.7-7.3 (6-7.4), *angulatus* 7.2-7.5 (6.5-8.2); mandible, *brachyotis* 21.5-22.8 (20.2-22.8), *angulatus* 24.2-25 (22.8-25.5); maxillary teeth (crowns), *brachyotis* 9.2-10.4 (8.8-10.4), *angulatus* 10.2-10.8 (10.2-11.3).

"If all the fourteen specimens are placed in a row the practised eye will easily pick out the four *angulatus*, owing to a different, but hardly describable, tinge of the colour of the upper side. If, similarly, the skulls are placed in a row those of *angulatus* are, of course, distinguishable at a glance by their conspicuously longer size (see measurements above).

"Of course, if a form really does exist, in the north of the Malay Peninsula, in the islands off S.E. Siam, and possibly somewhere else, which possesses the skull of *angulatus*\*, but the ears of *sphinx*†, then an entirely new and unsuspected element is introduced into the genus. But unless and until the existence of such a form is properly established, I should think it rather premature to discuss its probable effect on our arrangement."—*Knud Andersen*.

[Dr. Andersen's notes seem to call for some remark. With regard to the measurement I am satisfied that that used by me is the same as his, *i. e.* 'from orifice' (to the extreme tip understood). It is the only one of the outer external side that can be taken with any certainty and uniformity, and is so obvious that it suggests itself to every collector. The only possible alternative is the length of the inner external side from tip to base on the crown—quite another thing and not to be confounded with the former.

\* Cranial rostrum (orbit to nares) less than one-fourth of skull (lambda to gnathion).

† Ears from orifice (18-20.5 mm.).

Now *C. angulatus* Miller, does have long ears, for the measurements of the type series are given as 18–21 mm.\* The type-locality is Trang, S. Peninsular Siam or, to put it another way, Central Malay Peninsula. Recently Messrs. H. C. Robinson and E. Seimund obtained a series of bats from Bandon (about 100 miles to the north of this) and the adjacent islands of Koh Samui and Koh Pennan, with ears which they found to range between 18·5–21 mm.†, while I, again, consider my Koh Chang specimens to have ears of 18·5–21 mm. It is impossible to ignore the evidence of so many independent observers, which goes to prove that a bat with the long ears of Dr. Andersen's *sphinx* really does occur in this region.

The question then arises as to what is the *angulatus* of Andersen, based on a large mass of heterogeneous material from an extensive region, ranging from Assam and Annam to Sumatra and the islands off its western coast. Though it includes six of Miller's type series, three of which have the ear-length recorded as above, our author does not seem to have taken this statement into consideration.

Now Dr. Andersen recorded *C. brachyotis brachyotis* as also occurring throughout Sumatra and the Malay Peninsula as far north as Trang (and now in the islands of S.E. Siam), so that if *angulatus* is to be accepted as a form of *brachyotis*, as he desires, we have an instance of two subspecies of the same species living side by side; or, in other words, two geographical races or local forms occurring in the same place—a thing which most zoologists will flatly refuse to admit: they must either be the same thing or forms of two species.

Again, if on account of the long ears (which I think must be accepted as occurring in the Malay Peninsula and islands of Siam at any rate) we regard *angulatus* as a form of *sphinx*, we should have, if the long-eared *angulatus* occurs there too, a similar questionable state of affairs existing in Sumatra, which is inhabited by *tithaecheilus*, also, according to Andersen, a form of *sphinx*. So we are left with three alternatives: either *angulatus* has no real existence, the material forming it being part *sphinx* and part *brachyotis*—not very probable; or it is a very plastic and comprehensive form of the latter, of which the typical race is non-existent in Sumatra and the mainland; or it is an independent species. In the last case its central position is good reason for the possession of characters appertaining to both the other species:—long ears of *sphinx*, short rostrum of *brachyotis*, and medium size. And to explain the occurrence of all species in one locality to-day we may imagine *sphinx* extending eastward from Ceylon, *angulatus* southward from Indo-China, and *brachyotis* westward from, for present purposes—say, Borneo: all converging on Sumatra—probably the home of the other section of the genus *Nyctidius*. Or conversely, all species of *Cynopterus*

\* Miller, Proc. Acad. Nat. Sciences, Philadelphia, 1898, p. 316.

† Robinson & Kloss, Journ. F. M. S. Museums, vol. v. pp. 115, 134 (1915).



originated in the latter locality, and in the race for expansion the last got left at the post.—*C. B. K.*].

16. *RATUFA MELANOPEPLA LEUCOGENYS*, subsp. n.

*Sciurus javensis* Gray, P. Z. S. 1861, p. 137.

*Sciurus bicolor* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 582 (1904).

*Ratufa melanopepla* Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 15 (1914).

*Type.* Adult female (skin and skull), No. 1912/C.B.K. B.M. No. 15.11.4.43. Collected at Lem Ngop, S.E. Siam, on 15th January, 1915.

*Characters.*—Like *R. m. peninsulae* Miller (Proc. Washington Acad. Sci. vol. ii. p. 71, 1900; id., Smithsonian Miscellaneous Collections, vol. lxi. No. 21, p. 25, 1913), but yellow of cheeks, fore limbs, and under surface markedly paler than the respective areas in that form, yellow on thighs more extensive and continued along the sides of the feet on to their upper surfaces, where it occupies a considerable area, while the yellow of the fore limb extends to the base of the toes above.

*Colour.*—Upper surface and entire tail brownish black; a fairly conspicuous russet patch on the nape. Under surface pale orange-yellow. Cheeks to base of ear, but not reaching the eye, lower sides of neck, greater part of upper side of fore limb to base of toes ivory-yellow, becoming cream-colour on the posterior part of the fore limb. The yellow area of the under thigh continued as ivory-yellow along the outer side of the foot and on to the upper surface of the latter, where it occupies almost half of the area between the ankle and bases of the toes. Sides of muzzle like throat, but chin black.

*Skull and teeth.*—Possess apparently no constant features which will separate them from topotypes of *R. m. peninsulae*, from Trang, and others from Bandon, 100 miles to the north in Peninsular Siam. On the whole, the skulls appear to be a little longer.

*Measurements.*—Ears of the type 30.5, of the series 29.5–30.5 mm. For other measurements see table, p. 69.

*Specimens examined.*—Three, the type and two adult males from the same locality.

*Remarks.*—This race is separated from that of the Malay Peninsula by its pale yellow coloration and large yellow patch on the hind foot, while the yellow of the fore limb is greater in extent, reaching the base of the toes.

The individual obtained by Gyldenstolpe (*loc. cit. supra*) in Eastern Siam, south of Korat, is, judging from its measurements, of this form. *Ratufa phaeopepla* Miller (Smithsonian Miscellaneous Collections, vol. lxi. No. 21, p. 25, 1913), from South Tenasserim should occur also in Western Siam. It is like the animal of the Peninsula, but larger (hind foot 80–89, skull 74–78 mm.). Flower (P. Z. S. 1900, p. 355) records a black-and-

yellow Giant Squirrel from Phrabat, and observed another near Paknam Kabin which he believed had tufted ears. This feature would apparently indicate the presence near Bangkok of *Ratufa gigantea* McClelland, which, according to Wroughton (Journ. Bombay Nat. Hist. Soc. vol. xix. p. 890, 1910), also occurs in N. Siam. It is a large black-and-buff animal (head and body 417 mm., hind foot 87, skull 80), with the yellow on the fore limb confined to the inner side.

17. *RATUFA MELANOPEPLA SINUS*, subsp. n.

*Type.* Adult female (skin and skull), No. 1733/C.B.K. B.M. No. 15.11.4.41. Collected on Koh Kut Id., S.E. Siam, on 26th December, 1914.

*Characters.*—Like *R. m. peninsulae* Miller, but uniform black above with the under surface rather more ochraceous and extending slightly to the upper surface of the hind foot, while the yellow of the fore limb extends to the base of the toes above. Nasals rather longer.

*Colour.*—Upper surface and entire tail clear black. Under surface varying from ochraceous buff to ochraceous orange and ochraceous tawny in centre of abdomen. Cheeks to base of ear, sides of neck, and upper and inner side of fore limbs pale orange-yellow, deeper on the inner side of fore limbs. A small area of ochraceous buff on the outer and upper sides of the hind foot. Sides of muzzle like throat, but chin black.

*Skull and Teeth.*—Resemble those of *R. m. peninsulae* and *R. m. leucogenys*, except for the greater length of the nasals, the posterior terminations of which are more in line with those of the premaxillaries. The bullae are apparently a little shorter and broader.

*Measurements.*—Ears of the type 30, of the series 27–30 mm. For other measurements see table, p. 69.

*Specimens examined.*—Six adults, 3 males and 3 females.

*Remarks.*—This form differs from that of the adjacent mainland in being uniformly clear black above without any nuchal spot. The yellow areas are deeper in shade, those of the head, neck, and fore limbs being of about the same tone as the abdomen of *R. m. leucogenys*, while the patch of yellow on the upper side of the hind foot is smaller and somewhat disconnected from the yellow of the thigh.

This and the preceding race both differ from the Peninsular form in the constant presence of a considerable amount of yellow on the hind and fore feet. *Inter se*, the differences in colour are very marked, though those of the dorsal surface may be only seasonal. Size is about the same in all (a trifle larger in the S.E. Siamese forms), but the longer nasals of the island race further serve to distinguish it from both the others.

It may be pointed out that the forms from the islands of the Malayan part of the Peninsula (Teratau, Langkawi, Penang, and Tioman), *i. e.*, southern island forms, are all instantly separated

from the mainland races and from Siamese island forms (Telibon, Samui, Pennan, and Kut) by their deep ochraceous-tawny under surfaces and by the greater amount of black on the inner side of the hind limbs.

Though the island of Koh Chang is larger than Koh Kut, nearer to the mainland, and in much shallower water, no form of Giant Squirrel occurs on it. Yet the *Ratufa* of Siam was found immediately opposite the former, whereas all along the coast in the vicinity of Koh Kut it was not met with.

#### 18. *SCIURUS FERRUGINEUS CINNAMOMEUS* Temm.

*Sciurus cinnamomeus* Temminck, Esq. Zool. Guiné, 1853, p. 250; Wroughton, Ann. & Mag. Nat. Hist. ser. 8, vol. ii, p. 396 (1908); Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 12 (1914).

*Sciurus splendens* Gray, P. Z. S. 1861, p. 137.

*Sciurus ferrugineus* Anderson, Zoological Researches, p. 244 (1878); de Pousargues, Mission Pavie, Indo-Chine, Etudes Diverses, iii, p. 526 (1904).

*Sciurus finlaysoni* Flower (partim), P. Z. S. 1900, p. 355.

*Sciurus finlaysoni*. Type B (*Sc. splendens*), Bonhote, P. Z. S. 1901, vol. i, p. 53.

6 males, 7 females, Ok Yam, Franco-Siamese Boundary; 2 males, 3 females, Klong Yai; 2 males, 1 female, Klong Menao; 3 males, 2 females, Lem Ngop, S.E. Siam.

The above specimens show a certain amount of variation in colour. On the whole, however, they most nearly approach *Sciurus splendens*, var. 2 of Gray (= *cinnamomeus* Temm.). "Top of head (and top of back by inference) and tail dark and very intense red-bay; side of the back, under sides of the body, and tip of tail paler red-bay." A few approximate to var. 3. "Uniform pale bay, like the side of var. 2; tail and middle of the back rather darker and brighter; tail without pale tip," though the latter shows some signs of "bleaching" at the extremity. The majority of the collection have the sides of the head grizzled greyish, and there are traces of grizzling on the fore limbs: these latter features, together with an indication of grizzling on the thighs, being most pronounced among the five examples from Lem Ngop, the western extremity of the series. Again, two or three approach var. 1, "all over dark and very intense red-bay," except that they have no "white spot on each side of the base of the tail."

*Measurements*.—Ears of the series 19–23 mm. For other measurements see table, p. 70.

I do not know from what locality Temminck's *Sciurus cinnamomeus* came, and we have also no details as to the provenance of the animals on which Gray founded his species, beyond the fact that their collector, Mouhot, travelled widely in Siam and Cambodia; but it appears to me that when the Red Squirrel is fully known over the whole of its range it will be necessary to recognise several geographical races; to all of which the

opinion of Anderson (*op. cit.* p. 245) with regard to *S. cinnamomeus* will likewise apply, *i. e.*, that they are only local forms of *S. ferrugineus*.

Even in the present series, collected along a 50-mile stretch of coast, there are indications of geographical variation; for the eight specimens from the northern stations (Lem Ngop and Klong Menao) most nearly resemble Gray's var. 3, while, with the exception of three or four individuals like them, the eighteen darker southern animals come nearer var. 2.

#### 19. *SCIURUS FERRUGINEUS FRANDSENI*, subsp. n.

*Type.* Adult male (skin and skull), No. 1502/C.B.K. B.M. No. 15.11.4.85. Collected on Koh Chang Id., S.E. Siam, 12th December, 1914.

*Characters.*—Like *S. f. cinnamomeus* of the adjacent mainland, but with chin, throat, sides of head, outer sides of fore and hind limbs grizzled blackish or olive-brown.

*Colour.*—Top of head, upper part of body, and tail intense shining red-bay, becoming more fulvous towards the sides and on the thighs and behind the ears, the hairs black-tipped except on the distal half of the tail, which is clear reddish chestnut, somewhat bleached to fulvous at the extremity.

Muzzle, sides of head, chin, throat, shoulders, and sides of body olive-brown variably annulated with buff-yellow, strongest on throat and flanks; the shoulders, outer sides of fore limbs and thighs becoming black, finely annulated with buff. Entire under surface, except chin and throat, rich tawny, this colour extending to the fore feet and also to the hind feet, where it is mingled with black. There is a faintly indicated grizzled line down the centre of the chest and abdomen. Ears like the hind feet, their bases posteriorly dull ochraceous buffy.

*Skull and Teeth.*—As in the mainland race.

*Measurements.*—Type: Ear, 22 mm. Skull: basilar length, 44.4; brain-case breadth, 20; proximal breadth of nasals, 4; distal breadth of nasals, 8. Ears of the series, 19–22 mm. For other measurements see table, p. 70.

*Specimens examined.*—Sixteen, 9 males and 7 females, all from the type-locality.

*Remarks.*—In some of these animals the extent of black on the head is almost sufficient to form a black line between the crown and the grizzled portion of the face, and the fore feet are also partially black; in others the under surface is somewhat more orange than in the type.

The definition of *Sciurus splendens* var. 4, Gray (P. Z. S. 1861, p. 137), applies to some extent, as does also Anderson's description (Zool. Res. pp. 245–6) of an example considered by him to be *S. siamensis* Gray. The locality from which these latter two specimens came is unknown and, though I am unaware that Koh Chang has been previously visited by any naturalist, such may have been the case. The characters of *S. f. frandseni* are



so regular throughout in the series of sixteen as to render it an extremely distinct race, even though, as recorded above, animals from Lem Ngop (the nearest point of the mainland), having indications of grizzling on the thighs, tend to connect it with the more typical *cinnamomeus* animal. It is named after Captain H. E. Frandsen, R.N.R., Denmark, to whom I am indebted for much assistance and interesting information while in S.E. Siam.

20. *SCIURUS ALBIVEXILLI*, sp. n.

*Type.* Adult male (skin and skull), No. 1724/C.B.K. B.M. No. 15.11.4.46. Collected on Koh Kut Id., S.E. Siam, 25th December, 1914.

*Characters and Colour.*—Black throughout except the extremity of the tail, which is white.

*Skull and Teeth.*—As in *S. cinnamomeus*.

*Measurements.*—Type: Ear, 20.5 mm. Skull: basilar length, 436; brain-case breadth, 25.2; proximal breadth of nasals, 7; distal breadth of nasals, 4.4. Ears of the series, 19–21.5. For other measurements see table, p. 70.

*Specimens examined.*—Twenty-three, 12 males and 11 females, all from the type-locality.

*Remarks.*—*S. albivexilli* is somewhat variable in respect of the white tail-tip. In some animals the last 3 to 4 inches of the tail are white, and there is a white ring close to the bases of the hairs for the distal three-fourths of the tail; in others there are no annulations, and the pale tip is reduced to a bunch of greyish hairs at the extreme end.

Two other forms of Black Squirrel occur in Indo-China: *S. nor* Wroughton (Ann. & Mag. Nat. Hist. ser. 8, vol. ii, p. 397, 1908), in the neighbourhood of Siracha, on the eastern shore of the Inner Gulf near Bangkok, and *S. germaini* Milne-Edwards (Rev. Zool. 1867, p. 193) on Pulo Condor, south-east coast of Cochinchina: both are black throughout, but the latter is much smaller than the other. On distributional grounds it seems impossible to treat them and the present form as local races of one species, as there is no geographical connection, the mainland everywhere in the vicinity of Koh Kut being occupied by the red *S. cinnamomeus*.

The latter is, however, known to develop a white tail-tip, and it is possible that through *S. f. frandseni*, with its black-tipped upper pelage, blackish fore limbs and thighs, a connection may be traced between the Koh Kut animal and *S. cinnamomeus*. It is, however, very slight.

21. *TAMIOPS RODOLPHI* M.-E.

*Sciurus rodolphi* Milne-Edwards, Rev. et Mag. de Zool. xix. p. 227 (1867); id., Rech. Mamm. 1871, p. 162; de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 528 (1904).

*Sciurus maclellandi rodolphi* Bonhote, Ann. & Mag. Nat. Hist. ser. 7, vol. v. p. 54 (1900); id., P. Z. S. 1907, p. 10.

1 male, 1 female, from Lem Ngop, S.E. Siam.

I have not seen specimens of this squirrel from the type-locality (Cochin-China), nor is Milne-Edwards's description accessible to me, but Mr. Bonhote's remarks (*loc. cit. supra*) on examples from Cochin-China and Annam appear to apply to the individuals obtained in S.E. Siam.

The dark stripes are all grizzled with brown, the median black one being divided down the centre by a grizzled brown line, and the four light dorsal stripes are of equal breadth and distinctness, as stated by Mr. Bonhote; but while the outer two are cream-coloured, the inner pair are buff-yellow and show none of the pink tinge noted by him. The underparts are buff-yellow, not ferruginous, but this may be a matter of terms. The white tufts of the ears are black at their bases.

*Measurements*.—Ears, 13 mm. For other measurements see table, p. 72.

Another form of *Tamias* found in Siam is *T. novemlineatus* (Miller), which inhabits the Malay Peninsula, certainly as far north as the Isthmus of Kra. Bonhote (P. Z. S. 1901, i. p. 54) has described, under the name *kongensis*, animals obtained at Raheng and Nan, but these appear to differ from the *Tenasserim barbei* by just the same characters as does *novemlineatus*, so that it is doubtful whether they are really distinct from the latter.

## 22. MENETES BERDMOREI MOUHOTII Gray.

*Sciurus mouhotii* Gray, P. Z. S. 1861, p. 137.

*Sciurus pyrrhocephalus* Milne-Edwards, Rev. Zool. xix. 1867, p. 225; de Ponsargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 528 (1904).

*Funambulus berdmorei* Flower, P. Z. S. 1900, p. 359.

*Menetes berdmorei* Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 15 (1914).

*Menetes berdmorei mouhoti* Thomas, Journ. Bombay Nat. Hist. Soc. vol. xxiii. p. 23 (1914).

3 males, 3 females, Lem Ngop: 2 males, Klong Menao: 3 males, 2 females, Klong Yai, S.E. Siam; 1 male, 4 females, Ok Yam, Franco-Siamese Boundary.

I must confess that I find these specimens somewhat difficult to place. The only material available to me for comparison consists of four examples of *M. berdmorei berdmorei* from Martaban and Moulmein (Cat. Mamm. Indian Mus. specimens *a, b, c, d*) and a series of thirteen from Bandon, Peninsular Siam, which are apparently conspecific with those (*cf.* Robinson & Kloss, Journ. F. M. S. Museums, vol. v. p. 121, 1915), all of which are clearly distinguishable from the present series by the conspicuousness of the median dorsal and upper lateral blackish lines and somewhat smaller size.

Thomas, however, has recently reviewed the races of this squirrel (*loc. cit. supra*) and, though one would, on geographical grounds, place the present animals in the form *mouhotii*, one can also regard part of the series as of that subspecies as defined by him and allot the remainder to his new race *consularis* of Northern Siam. If we only knew the exact type-locality of *M. b. mouhotii*, given vaguely as Cambodia (Gray, *loc. cit. supra*), we should probably find that these S.E. Siamese animals are geographically, as they are in appearance, intermediate between the two.

Gray, who only had one specimen when describing *mouhotii*, makes no mention of any dark stripes between the upper pale ones, and *consularis* resembles his type in that respect. Thomas, however, in extending the range of *mouhotii* from south of Bangkok to Cochin-China, reports three inconspicuous black stripes on the back between the upper pale ones as in *berdmorei*: *mouhotii* is white or whitish below, *consularis* yellowish white. The series of 16 animals from S.E. Siam have backs ranging from three to no dark stripes and under surfaces from white to yellowish white.

The individuals from Eastern Siam (Korat) referred by Gyldenstolpe (*loc. cit. supra*) to *M. berdmorei* require further examination.

Thus, exclusive of the two island races described below, the following forms seem to inhabit our region: the true *berdmorei* in Peninsular and perhaps Western Siam; *consularis* in Northern and perhaps Eastern Siam; and *mouhotii* in South-eastern Siam.

The species seems to increase in size from west to east; the three forms mentioned here are all larger than those from Burma and the Malay Peninsula, and *M. b. moereszens* from Annam (Thomas, *loc. cit. supra*) is believed to be larger also.

*Measurements*.—Ears of the series, 18.5–21 mm. For other measurements see table, p. 71.

### 23. MENETES BERDMOREI UMBROSUS, subsp. n.

*Type*. Adult female (skin and skull), No. 1449/C.B.K. B.M. No. 15.11.4.97. Collected on Koh Chang Id., S.E. Siam, 8th December, 1914.

*Diagnosis*.—Like *M. b. mouhotii* from the adjacent mainland, but darker above; the three upper dark stripes very faintly indicated by a blackish wash, the upper pale stripe narrower and a deeper buff, the lower also deeper in tint but less distinct, approaching in colour the outer side of the thighs; the sides of the abdomen between the limbs also darker. Under surface somewhat more deeply buffy. Tail more ochraceous, blacker and much less hoary.

*Skull and Teeth*.—As in the mainland animal.

*Measurements*.—Ears of the type, 20, of the series, 17.5–20 mm. For other measurements see table, p. 71.

*Specimens examined*.—Six, 3 males and 3 females.

*Remarks*.—There is extremely little variation in the series from Koh Chang, which is easily separated on the above characters from the mainland form. The dark dorsal stripes, though obsolete, are indicated by an increase in the amount of black annulation, but are not so intense in colour as the area between the lateral pale stripes.

## 24. *MENETES BERDMOREI RUFESCENS*, subsp. n.

*Type*. Adult female (skin and skull), No. 1740/C.B.K. B.M. No. 15.11.4.93. Collected on Koh Kut Id., S.E. Siam, 26th December, 1914.

*Diagnosis*.—Lighter and more rufous above than the neighbouring continental form, dark dorsal stripes absent, dark lateral stripe not deeper in colour than the back; upper pale stripe a little less intense, the lower much less distinct; sides of body bordering the abdomen considerably darker. Under surface slightly richer buff. Tail darker and much less hoary.

*Skull and Teeth*.—As in the mainland animal.

*Measurements*.—Ears of the type, 17, of the series, 17–22 mm. For other measurements see table, p. 71.

*Specimens examined*.—Nineteen, 11 males and 8 females.

*Remarks*.—As in the series of 18 examples from the adjacent mainland dealt with above, there is a certain amount of variation in the dorsal area of this race, some examples having the dark lateral dorsal stripes present to a slight degree and the median one just indicated: when this is the case the area between the pale lateral stripes is proportionately darker also. The other differences, however, are consistently maintained and the series further includes the largest animals obtained in this region.

## 25. *EPIMYS JERDONI MARINUS*, subsp. n.

*Type*. Adult male (skin and skull), No. 1455/C.B.K. B.M. No. 15.11.4.160. Collected on Koh Chang Id., S.E. Siam, 9th December, 1914.

*Characters*.—Resembles *Epimys jerdoni bukit* (Bonhote), but with the white of the under parts hardly ever extending to the foot, and tail rather shorter. Skull with smaller bullæ, larger palatal foramina, and broader interpterygoid space.

*Colour*.—Above ochraceous tawny, much darkened or streaked by the exposed tips of the numerous stiff spines which have greenish horn-coloured bases. Base of fur grey. Below yellowish white to the base of the hairs, extending over the fore limbs to the hands, but not quite reaching the hind feet, which are white with brownish centres. Tail bicoloured with a dark tip.

*Skull and Teeth*.—Like those of *E. j. bukit*, but with smaller and more flattened bullæ; broader interpterygoid space, the outline of which is more angular owing to the straighter anterior margin; palatal foramina larger, nearer the incisors, and the



nasals slightly more projecting anteriorly. In all except the first of these characters the skull more nearly resembles *E. j. pan* Robinson & Kloss, from Koh Samui Id. of the opposite side of the Gulf, but differs in the bullæ, which in that race agree with *E. j. bukit*.

*Measurements*.—Ear of type, 20 mm. For other measurements see table, p. 72.

*Specimens examined*.—Twenty-two from Koh Chang and twenty-three from Koh Kut.

*Remarks*.—Besides externally closely resembling *E. j. bukit*, this race is also very similar in appearance to *E. j. pan*. While, however, in the former the white of the under parts nearly always reaches to the foot, in *marinus* it generally just fails to do so, and in the latter it always stops considerably short of the ankle.

Although these rats were exceedingly common on the two islands none was met with on the mainland, so that I have had to compare them with animals from the Malay Peninsula, which Bonhote states (*Fasciculi Malayenses*, Zoology, part 1, p. 27) exactly agree with those of Siam: in which case *E. lepidus* Miller, founded on a single adult individual from Southern Tenasserim (an intermediate locality), is also probably an example of *E. j. bukit*. The position of this latter with regard to the true *E. jerdoni* (Blyth) of Sikkim is not fully known, but from the few details recorded of Darjiling specimens (Thomas, P. Z. S. 1881, p. 538; Blanford, Faun. Brit. India, Mammals, p. 411), it would appear that the typical animal is a smaller form having a tail actually, and so relatively much, longer than *bukit* (and therefore still longer than *marinus*).

In my experience the *jerdoni* rat is by no means common in the Malay Peninsula, and I failed to meet with it in S.E. Siam. Of the small islands of these areas, *E. j. pan* had only recently been discovered on Koh Samui, and I was therefore much surprised to find a form occurring in great abundance on the two larger islands of the Chantabun Archipelago, where it used to come into my camp at twilight in search of food.

The Koh Kut animals seem to be a trifle smaller than those of the type-locality, but apart from that I can detect no difference whatever.

## 26. *EPIMYS SURIFER FINIS*, subsp. n.

*Type*. Aged male (skin and skull), No. 1885/C.B.K. B.M. No. 15.11.4.117. Collected at Klong Menao, S.E. Siam, 11th January, 1915.

*Characters*.—Like *Epimys surifer* Miller, from Peninsular Siam (Trang), but duller; white of under surface normally extending to the ankle and over the bases of the vibrissæ.

*Colour*.—Upper surface ochraceous tawny, clouded on the back by the dark tips of the flattened spines. Under parts white, extending to the hind feet and to the roots of the vibrissæ, but

not always to the hands. Tail averaging longer than head and body, bicoloured with white tip. Hands and feet white.

*Skull and Teeth.*—Resemble those of the typical race and show no characters which will consistently serve to distinguish them from it.

*Measurements.*—Ear of type, 24.5 mm. For other measurements see table, p. 73.

*Specimens examined.*—Twenty-six: 3 from Ok Yam, 5 from Klong Yai, and 18 from Klong Menao.

*Remarks.*—The above series has been compared with a large series of topotypes from Trang, Peninsular Siam, and also with a number recently obtained in Bandon (about 100 miles to the north of that locality), and distinctly differs as pointed out; though, as is always the case with two neighbouring continental races, the extremes of the two series closely resemble each other. The extension of the white area to the foot occurs in the great majority of examples from S.E. Siam, whereas in series from Peninsular Siam the contrary is the case.

*Epimys surifer* has only previously been recorded from Siam by Gyldenstolpe (Arkiv för Zoologi, Band 8, No. 23, p. 16, 1914), who obtained a single example on the Korat Plateau.

## 27. *EPIMYS SURIFER CHANGENSIS*, subsp. n.

*Type.* Aged male (skin and skull), No. 1492/C.B.K. B.M. No. 15.11.4.142. Collected on Koh Chang Id., S.E. Siam, 11th December, 1914.

*Diagnosis.*—Like *E. s. finis*, but with tail averaging shorter than head and body, the dark speckle of the upper surface much coarser and the white of the under parts more extensive on limbs, broadening, in some examples across the body and spreading up the sides of the muzzle and over the upper side of the fore limb.

*Measurements.*—Ear of type, 25 mm. For other measurements see table, p. 73.

*Specimens examined.*—Thirty-three from the type-locality.

*Remarks.*—The tendency in this race to develop a white fore limb and a short tail approximates it to *E. s. manicalis* Robinson & Kloss\*, from Koh Pennan on the opposite side of the Gulf of Siam, from which, however, it is clearly distinguished by its much duller upper colour.

## 28. *EPIMYS SURIFER KUTENSIS*, subsp. n.

*Type.* Aged male (skin and skull), No. 1710/C.B.K. B.M. No. 15.11.4.151. Collected on Koh Kut Id., S.E. Siam, 25th December, 1914.

*Diagnosis.*—Like *E. s. changensis*, but a trifle less tawny and with less tendency for the white areas to increase (in this coming nearer to the mainland form); anterior root of the zygomatic

\* Ann. Mag. Nat. Hist. ser. 8, vol. xiii. p. 230 (1914).

arch much narrower than in the two preceding races, this diminution markedly increasing the size of the infraorbital foramina as seen from above.

*Measurements*.—Ear of type, 24 mm. For other measurements see table, p. 73.

*Specimens examined*.—Twenty-nine from Koh Kut.

29. *EPIMYS SURIFER PELAGIUS*, subsp. n.

*Type*. Adult male (skin and skull), No. 1659/C.B.K. B.M. No. 15.11.4.109. Collected on Koh Rang Id., S.E. Siam, 22nd December, 1914.

*Diagnosis*.—Colour bright clay, duller than the foregoing races, and further differing from the mainland animal in having the tail shorter than the head and body, from *E. s. changensis* in showing no tendency to extension of the white area, and from *E. s. kutensis* in the broader anterior zygomatic root.

*Measurements*.—Ear of type, 25 mm. For other measurements see table, p. 73.

*Specimens examined*.—Twenty-one, all from the type-locality.

30. *EPIMYS SURIFER CONNECTENS*, subsp. n.

*Type*. Adult female (skin and skull), No. 1613/C.B.K. B.M. No. 15.11.4.135. Collected on Koh Mak Id., S.E. Siam, 19th December, 1914.

*Diagnosis*.—Clay-coloured above, closely resembling *E. s. pelagius*, though with the white on the hind limb in some instances a little reduced towards the ankle. Skull with slightly broader nasals and rostrum, and profile less curved. This latter character is difficult to define, but if skulls are compared when resting on their upper sides, *connectens* skulls will be seen to have the anterior palate and incisors on a lower plane than those of *pelagius* or *finis*; or if placed end to end the tips of the nasals of the latter two always enter the nasal cavity of the other. Zygomatic breadth is little greater, and palatal foramina are slightly larger.

*Measurements*.—Ear of type, 24 mm. For other measurements see table, p. 74.

*Specimens examined*.—Twenty, all from the type-locality.

*Remarks*.—This race is somewhat intermediate between the preceding and following forms, in that the continuation of the white area to the foot is rather indistinct in several examples, while in two specimens (an adult and a subadult female) the under side of the fore limbs, a band across the chest, and the lower part of the hind limbs are pale ochraceous tawny.

31. *EPIMYS SURIFER ECLIPSIS*, subsp. n.

*Type*. Adult male (skin and skull), No. 1540/C.B.K. B.M. No. 15.11.4.125. Collected on Koh Kra Id., S.E. Siam, 16th December, 1914.

*Characters*.—Clay-coloured; white of lower side much reduced

in breadth, not very sharply margined, and not extending to the limbs. *Tail dark with a white tip.*

*Colour.*—A variable clay, the dorsal area everywhere much darkened by the bistre tips of the spines; this colour extending over the whole of the limbs, across the chest in the form of a broad gorget, the hairs of which have distinct grey bases, and over the entire muzzle, which is rather browner. White of under surface reduced to a comparatively narrow band running from the axillæ to groin, 25–30 mm. wide, and to an isolated patch confined to the throat. Fore and hind feet pale. Tail about the same length as head and body, dark for the basal two-thirds or three-fourths, the tip white, not sharply defined from the rest.

*Skull and Teeth.*—Generally resemble the mainland race, but with the nasals broader posteriorly, their outer margins straighter; the palatal foramina distinctly larger, being both longer and broader; anterior zygomatic plate broader; and the zygomatic breadth a little greater.

*Measurements.*—Ear of type, 24.5 mm. For other measurements see table, p. 74.

*Specimens examined.*—Nineteen from the type-locality.

*Remarks.*—Its dull colour, reduced white areas, and non-bicoloured tail render this race of *Epimys surifer* the most distinct known to me. All the Indo-Chinese forms here described are less brilliant in colour than any of the Malayan races of the *rajah-surifer* group, and their tendency to dullness, manifesting itself strongly in the island forms, culminates so notably in the Koh Kra animal, that, with its other characters in addition, one would readily accept it as a distinct species were it the inhabitant of a large land-mass and not of a little satellite islet.

32, *EPIMYS SURIFER TENEBROSUS*, subsp. n.

*Type.* Adult male (skin and skull), No. 1586/C.B.K. B.M. No. 15,11,4,121. Collected on Koh Klum, S.E. Siam, 18th December, 1914.

*Diagnosis.*—Like *E. s. eclipsis* above, but rather more darkened down the median line of the back. Below the white area rather broader, but not to the extent of the more typical forms, and extending a little way across the groin on to the thigh. Wrists very pale, but separated from the chest; white area of neck a little larger, but confined to the throat. Gorget clearer in colour and rather less distinct, the grey bases of the hairs not visible. Tail shorter than head and body; bicoloured with a white tip.

*Skull and Teeth.*—Like those of *E. s. eclipsis*, but the palatal foramina smaller, about the same length as the mainland form, but broader; the interorbital breadth markedly greater than either, and the anterior zygomatic root broader.

*Measurements.*—Ear of type, 24 mm. For other measurements see table, p. 74.



*Specimens examined*.—Eight from the type-locality.

*Remarks*.—This form is an intermediate stage between *connectens* and *eclipsis*. The former in isolated individuals is beginning to show the tendency towards increase in the yellow areas, while in the present animal this, as well as the darker coloration, is now well and constantly established. Both, however, still retain the normal bicolored tail.

It is interesting to note that in this small group of islands two opposite types of deviation occur: in *E. s. changensis* and *kutensis* the trend is towards an increase of the abdominal white area, while in this race and *E. s. eclipsis* it is the dorsal colour that has spread until it reaches a climax in the last form in conjunction with extreme dullness of tint and blackened tail.

### 33. *EPIMYS RATTUS*, subsp.

*Mus rattus* Bonhote, P. Z. S. 1900, p. 194: id., op. cit. 1901, vol. i. p. 56; Flower, op. cit. 1900, p. 361.

*Mus rattus rufescens* de Pousargues, Mission Pavie, Indochine, Études Diverses, iii. p. 528 (1904).

*Epimys rufescens* Gyldenstolpe, Arkiv för Zoologi, Stockholm, Band 8, No. 23, p. 18 (1914).

I obtained at Ok Yam and Klong Yai a series of 13 rats, which are apparently indistinguishable from the common *Epimys rattus* of the Malay Peninsula, except that the white underparts more frequently assume a light silvery shade. I have had no opportunity of comparing them with *Epimys rattus robustulus* (Blyth) from Tenasserim, and therefore place them under the specific name. The tail is longer than the head and body and slightly paler below proximally; the feet are whitish.

One female from Ok Yam (No. 1797) is abnormal in having the tail slightly shorter than head and body and concoloured, the feet dark; the upper side blackish brown and the underparts of a colour intermediate between mouse-grey and neutral-grey.

With these I would associate four examples from Koh Chang Id.

From the two islands, Koh Melisi East and West, series of 13 and 15 respectively were obtained. While showing much variability among themselves, all are apparently conspecific with the above. They range from melanotic individuals having backs strongly suffused with blackish brown to others having that surface of warm grizzled-brown, while underparts vary from white to grey.

This difference in colour is not a question of sex or age, for though juveniles generally (not invariably) have greyish undersides, yet these are by no means of so dark a shade as the extremes of the adults; neither do the darker-backed individuals always have darker underparts, though, again, this is generally the case.

The effect is to make the insular series much darker than the mainland one, but as this character is apparently transitory, it cannot be used for the purpose of differentiation.

*Measurements*.—See table, p. 75.

34. *EPIMYS RATTUS RANGENSIS*, subsp. n.

*Type.* Adult female (skin and skull), No. 1669/C.B.K. B.M. No. 15.11.4.208. Collected on Koh Rang Id., 22nd December, 1914.

*Diagnosis.*—Closely resembles the adjacent mainland normal form of *E. rattus*, but with the pelage a little coarser. Skull broader throughout—rostrum, palate, interpterygoid space, basi-occipital and zygomata—but with smaller palatal foramina, which do not reach a line joining the anterior ends of the molar rows. Nasals shorter and more truncate, so that when the skulls are reversed and resting on their upper surfaces the ends of the nasals are not visible from above.

*Measurements.*—Ear of type, 22 mm. For other measurements see table, p. 75.

*Specimens examined.*—Six from the type-locality.

*Remarks.*—Though differing very little bodily from the mainland animal, this race is easily separated from it on cranial characters, the short nasals and blunt muzzle being very distinct.

35. *EPIMYS RATTUS KLUMENSIS*, subsp. n.

*Type.* Adult female (skin and skull), No. 1596/C.B.K. B.M. No. 15.11.4.207. Collected on Koh Klum Id., S.E. Siam, 18th December, 1914.

*Diagnosis.*—Size larger and pelage coarser than the previous forms, with numerous long black piles on the rump. Colour above grizzled-brown and buff, darkest on the rump; below ivory-yellow, an indistinct greyish band along either side of the abdomen, separating it from the colour of the upper parts. Feet parti-coloured; tail considerably longer than body, relatively longer than any of the other local races.

Skull generally resembling that of the mainland animal, but more robust and with the nasals much narrower posteriorly and longer, prolonged well behind a line joining the anterior edges of the orbits.

*Measurements.*—See table, p. 75.

*Specimens examined.*—Five from the type-locality.

*Remarks.*—The larger size, relatively long tail, and long, posteriorly narrower, nasals clearly distinguish this race from either of the preceding; particularly the latter with its short square muzzle. It belongs, with the following forms, to the section of the *rattus* group consisting of large animals heavily sprinkled on the rump with long piles, and having large robust skulls, which includes the similar races of *Epimys pannosus* and *mara* Miller, *E. remotus* Robinson & Kloss, and is largely of insular habitat.

36. *EPIMYS RATTUS MAKENSIS*, subsp. n.

*Type.* Adult male (skin and skull), No. 1616/C.B.K. B.M. No. 15.11.4.211. Collected on Koh Mak Id., S.E. Siam, 19th December, 1914.

*Diagnosis*.—Closely resembles *E. r. klumensis* in colour, but with the under surface generally slightly silvered, especially in immature individuals. Size slightly larger, but tail considerably shorter. Nasals relatively rather narrower posteriorly, but skull otherwise apparently not differing from the mainland race except in greater size and robustness.

*Measurements*.—Ear of type, 23 mm. For other measurements see table, p. 75.

*Specimens examined*.—Fifteen from type-locality.

### 37. *EPIMYS RATTUS KRAENSIS*, subsp. n.

*Type*. Adult female (skin and skull), No. 1550/C.B.K. B.M. No. 15.11.4.203. Collected in Koh Kra Id., S.E. Siam, 16th December, 1914.

*Diagnosis*.—The largest of the known local forms of *E. rattus*, but with tail relatively shorter than in *E. s. klumensis*. Colour like *E. r. makensis*, but the grey edges of the abdomen more intense and skull with broader rostrum and nasals: anterior zygomatic roots heavier: the zygomatic plate broader and more convex, projecting further forwards: the plate laterally compressed and more vertical, resulting in a narrower infraorbital foramen.

*Measurements*.—See table, p. 75.

*Specimens examined*.—Twenty-one from the type-locality.

### 38. *EPIMYS GRISEIVENTER* Bonhote.

*Mus griseiventer* Bonhote, Fasciculi Malayenses, Zoology, Part 1, p. 30, pl. ii. fig. 3, and pl. iv. fig. 5 (1903).

A single example only of a rat that appears referable to this species was obtained on Koh Chang. As my camp was close to a village, which is a port of call for steamers, it is quite possible that the species has been introduced. The uniform upper surface, smoky-grey underparts tinged with buff, dark feet, and black tail distinguish it from forms of *E. rattus*.

Head and body 181 mm., tail 212, hind foot 34, ear 22.

### 39. *EPIMYS CONCOLOR* Bonhote.

*Mus concolor* Bonhote, P. Z. S. 1900, p. 195; id., op. cit. 1902, vol. i. p. 39; Flower, op. cit. 1900, p. 361; de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 528 (1904); Gyldenstolpe, Arkiv för Zoologi, Stockholm, Band 8, No. 1, p. 18 (1914).

Numerous specimens of this little rat were brought to me by the children of Klong Yai for the sake of a cent. or two, but all were immature, and I only preserved five examples.

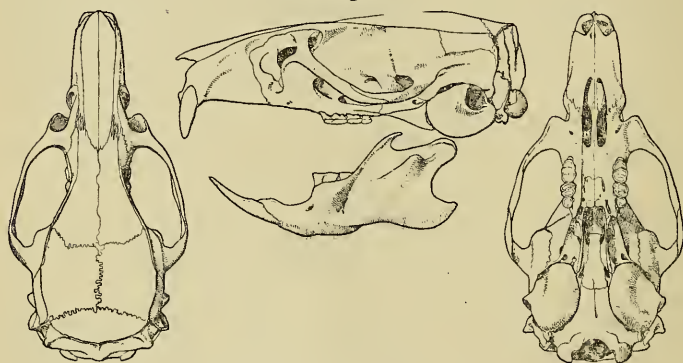
### 40. *EPIMYS BERDMOREI MAGNUS*, subsp. n. (Text-fig. 1.)

*Type*. Adult female (skin and skull), No. 1890/C.B.K. B.M. No. 15.11.4.157. Collected at Klong Menao, S.E. Siam, 12th January, 1915.

*Characters*.—A large form of *Mus berdmorei*, with smaller ears and tail considerably shorter than head and body, bicoloured with dark tip. Pelage of two elements:—slender, very flexible spines, with light bases and dark brown tips, and soft under-fur with neutral grey bases and dirty-white or drab tips. Mammeæ 3-2 = 10.

*Colour*.—General colour of the upper pelage, which is harsh but not stiff, clove-brown on the median dorsal area, lightening to mouse-grey on the cheeks, sides, and limbs; everywhere grizzled with the pale tips of the under-fur, and on the sides by the exposed pale portions of the spines also. When disturbed the neutral-grey basal colour contrasts sharply with the browner external tone. In certain lights a brilliant green sheen is visible from nape to rump. Under surface of body and limbs and the upper surface of the hands and feet white to the bases of

Text-figure 1.

Skull of *Epimys berdmorei magnus*.

the hairs: the white area extends to the extremities and the upper lip, but does not include the bases of the vibrissæ. Ears rounded and almost naked, a small white patch below the ear-opening. Tail bicoloured, only the basal three-fourths white beneath, the distal fourth entirely dark; somewhat thickly clad with short hairs, black on the dark, white on the white area, but no pencil; in the centre eleven rings of scutes to the centimetre.

*Skull and Teeth*.—I have been privileged to examine the skull of Blyth's *Mus berdmorei*, all that remains of the type which came from Mergui, Tenasserim; it lacks the bullæ and the posterior half of the cranium, while the teeth are only just beginning to show signs of wear. The Klong Menao individual, while otherwise resembling it, is considerably larger with apparently a relatively longer rostrum. The zygomatic plate is, however, actually narrower, as is also the anterior root of the zygoma, while the posterior root is more robust; the fronto-



parietal suture is less curved and the incisors are paler, being ivory-white with white tips, though they project in the notable manner of the type of *Mus berdmorei*; while the molars are of similar small size, and the rostrum is likewise elongated, with a straight or only slightly curved upper profile. No information is available as to the bullæ of the latter, but those of *E. b. magnus* are perhaps larger than are to be found in any eastern rat of equal size, being extremely dilated and kidney-shaped. Thomas, in the account of the skulls seen by him (see below), does not mention this very notable feature.

*Measurements.*—I give, in the form of a comparative table, the measurements of the present animal, of the type of *Mus berdmorei*, and such others as have been published of animals which have been allocated to the species\*.

*Collector's External Measurements, in millimetres.*

	Siam.	Type.	Thagata.	Bhamo.	Manipur.
Head and body .....	210	circa 155	170	142	174
Tail .....	182	circa 150	...	163	172
Hind foot .....	38·5	35	32	35	36
Ear .....	19·5	...	20	22	...

*Skull Measurements.*

	Siam.	Type.	Thagata.	Manipur.
Greatest length .....	47	...	...	...
Condylø-basilar length .....	43·2	...	...	...
Basal length .....	42·2	...	36·4	...
Palatal length .....	24·6	22·2	21·4	22·4
Palatal foramina .....	9·2	8·1	7·1	7·8
Diastema .....	10·1	14·0	12·9	14·1
Upper molar series .....	7·0	6·6	6·0	6·1
Length of nasals .....	19·2	16·0	14·0	16·0
Anterior breadth of nasals .....	4·8	4·2	...	...
Interorbital breadth .....	7·1	6·6	6·8	7·0
Zygomatic breadth .....	24·0	21·5	21·8	21·5
Cranial breadth .....	17·0	16·5	...	...
Interparietal breadth .....	14·7	13·7	10·3	...
„ length .....	8·1	...	4·0	...
Extreme breadth between outer edges of infraorbital foramina .....	12·1	11·0	10·4	...
Zygomatic plate .....	4·8	5·0	4·0	4·7
Extreme breadth between auditory meati .....	18·8	...	...	...
Breadth of basioccipital at suture .....	3·5	...	...	...

\* Thomas, P. Z. S. 1886, p. 62, two unsexed specimens from Manipur: id., Ann. Mus. Civ. Genova, ser. 2 a, vol. x. (xxx.), 1892, two females from Thagata, Tenasserim and Bhamo, Burma.

*Remarks.*—The above measurements show the much greater size of the eastern animal as compared with the western individuals, while the colour of the latter, given by Thomas as “clear slaty grey,” is also very different from the brownish tone of the other.

The type of *Epimys berdmorei* was described as being of about a foot in length, of which the tail was not quite half; hind foot  $1\frac{3}{8}$  inches. Fur shortish, even, coarse and hispid, but not spinous, of one quality only. Incisors white. Tail rather more copiously clad than usual with short hairs. The upper side, originally given as grizzled-grey, unmixed with rufous, was later stated by Blyth (*op. cit.* xxxii. p. 343) to be dull brown, which is in close agreement with the colour of the present animal.

The species is in no way related to *E. ferreocanus* Miller, of Peninsular Siam.

#### 41. ACANTHION KLOSSI THOS.

A single porcupine of the *bengalensis* type was obtained on the mainland at Klong Yai.

It is remarkable how little information we have concerning *Hystrix bengalensis*. There is Blyth's original description\* founded, I am able to state (thanks to authorities of the Indian Museum, Calcutta, who have lent me the type skull for examination), on a half-grown individual with incomplete dentition, supposed to come from the Sunderbunds. There is Jerdon, in the ‘Mammals of India,’ who borrowed from Blyth, and there is Anderson, who, in his ‘Zoological Researches,’ when treating of *H. yunnanensis*, gives (passim) a few fresh details, while Blanford, the latest author to deal with the species, had no material for examination when writing for the ‘Fauna of British India,’ and simply repeated Blyth's original description. Beyond this unsatisfactory literature no other details of topotypes seem available, and I am forced to supplement it by measurements of a skull from the Karen Hills given by Thomas in his paper on the Mammalia collected by Signor Fea in Burma and Tenasserim †.

The present example, while generally agreeing externally with descriptions of *Acanthion bengalensis* (Blyth), differs in the following respects:—The longest bristles of the crest are only 4 to 5 inches long, but are tipped with white for more than half their length; the white demi-collar is ill-defined on the middle of the throat; the quills are white with a dark band at their centres, rather than white and black with a more or less defined white tip, and the few long flexible quills are white throughout, lacking any dark middle band. Blyth's description, however, is hardly

\* Journal Asiatic Soc. Bengal, vol. xx. p. 170 (1851).

† Ann. Mus. Civ. Genova, ser. 2 a, x. (xxx.), p. 37 (1892).

up to modern requirements for subspecific purposes, and is at best that of a young animal only.

Measurements of the skull are as follows; those in parentheses being of the Karen Hill animal referred to above:—Basal length, 119 (119) mm.; greatest breadth, 75·5 (68); mesial nasal length, 71 (64); anterior nasal breadth, 27 (29); posterior nasal breadth, 36·5 (40); length of naso-premaxillary suture, 43 (39); length of frontal suture, 31 (29); bregma to back of occipital crest, 42 (34); diastema, 36 (38); upper molar series, 31 (27); distance between outer corners of the two infraorbital foramina, 57 (53); height of nasion from centre of palate, 51 (51).

Thus the Siamese-Cambodian skull, while of the same length, is broader than the other; but the nasals are narrower throughout, though longer; the tooth-row is longer, as is that portion of the skull posterior to the bregma.

Other measurements that may be recorded are:—Median dorsal length\* of skull, 139 mm.; median nasal length, 71; median frontal length, 31; median parietal length, 18. Collector's external measurements:—Head and body, 835; tail, 115; hind foot, 93; ear, 45·5.

Having regard to these differences, together with geographical derivation, S.E. Siam being more than a thousand miles distant from the Sunderbunds, it seems possible that the eastern animal may eventually prove distinct; but until the mammal survey of India, now much curtailed, has been actively resumed again, and topotypes of *bengalensis* are available, nothing can be done. For the present, therefore, I content myself with the above remarks.

Pousargues, in Mission Pavie, Indo-Chine, Études Diverses, iii. p. 533 (1904), states that *H. bengalensis* does not extend eastward beyond Burma, but Gyldenstolpe (Arkiv för Zoologi, Band 8, No. 23, p. 20) has since recorded, under this name, a porcupine obtained by him in Northern Siam which appears to be intermediate in cranial dimensions between Fea's Tenasserim specimen and the present animal.

[At Mr. Kloss's request I have examined this skull, and it is referred to in my paper on *Acanthion klossi*, Ann. Mag. N. H. (8) xvii. p. 136, Jan. 1916.—O. Thomas.]

#### 42. MONTIACUS MUNTJAK, subsp.

An immature male, with the posterior molars not fully up, was obtained on Koh Chang Id.

It is a very brightly coloured animal. Dorsal region and upper side of tail fulvous-chestnut becoming ochraceous on the under surface, limbs, base of ears, and sides of head. Forehead and front of pedicels tawny, top of muzzle brown. On the nape and the front of the lower limbs there is a scattering of blackish-brown hairs, which are in excess near the hoofs, particularly on the hind feet. A black line along the horn pedicels and the

facial rib. Chin and throat, inner side and posterior outer side of ears, axillary region, lower abdomen, inner side of thighs, under side of tail, back of lower fore limbs, and a small patch in front of the digits of each foot, white. Head and body, 980 mm.; tail, 185; hind foot, 291; ear, 105; height at shoulder, 610. Skull, greatest length, 203; greatest breadth, 81.

The horns, which are not yet differentiated from the pedicels, are tipped with velvet, and the distance in a straight line from the tips to the base of the pedicels on the inner side is 146 mm.

The Barking Deer of Siam was described by Gray (P. Z. S. 1861, p. 139) from a skull with deformed antlers as *Cervulus curvostylis*. Recently Mr. R. Lydekker, whose death all interested in game animals will much regret, has defined this race in the 'British Museum Catalogue of Ungulates,' vol. iv., as being of medium size (upper row of cheek-teeth  $2\frac{3}{15}$  inches), general colour orange-tawny, fading to buffish on neck and underparts.

The present specimen is so young (milk premolars still in place) that, lacking other material from Indo-China for comparison, I have not applied any subspecific name for the present. The skull is remarkable for the reduced size and marked definition of the lachrymal pit, which is far smaller than any other which I have had the opportunity of inspecting, the upper edge being very sharp and the pit immediately within and above this notably concave. The vertical portion of the lachrymal is, further, much reduced in height.

#### 43. CERVUS UNICOLOR, subsp.

*Rusa peronii* Gray, P. Z. S. 1861, p. 138 (?).

*Cervulus cambojensis* Gray, loc. cit. supra.

*Cervus unicolor* Flower, P. Z. S. 1900, p. 372.

*Cervus aristotelis* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 536 (1904).

*Cervus unicolor equinus* Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 30 (1914).

A form of Sambhar is represented in my collection by an immature female from Klong Yai, S.E. Siam. Height at shoulder, 760 mm.

The hairy frontlet and antlers of a deer collected by Mouhot in Cambodia was described by Gray (P. Z. S. 1861, p. 138), who then considered it to be a Muntjac, as *Cervulus cambojensis*, but was later identified by him as *Rucervus schomburgki*! (Brit. Mus. Cat. Ruminants, p. 76 (1872); Brit. Mus. Hand-list Ruminants, p. 145 (1873)). Lydekker, however, regards this specimen as belonging to *Cervus unicolor* (Brit. Mus. Cat. Ungulates, vol. iv. p. 79 (1915)), and if he is correct, and the Indo Chinese Sambhar prove to be distinct, it will have to be known as *C. u. cambojensis* Gray.



44. *TRAGULUS KANCHIL AFFINIS* Gray.

*Tragulus affinis* Gray, P. Z. S. 1861, p. 138.

*Tragulus javanicus* Flower, P. Z. S. 1900, p. 374.

*Tragulus kanchil pierreii* Bonhote, Ann. & Mag. Nat. Hist. ser. 7, vol. xi. p. 293 (1903); Lydekker, Brit. Mus. Cat. Ungulates, vol. iv. p. 291 (1915).

*Tragulus kanchil* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 535 (1904).

*Tragulus kanchil affinis* Bonhote, P. Z. S. 1907, p. 11; Gyldenstolpe, Arkiv för Zoologi, Band 8, No. 23, p. 29 (1914); Lydekker (partim).

A single female, with very worn teeth, from Ok Yam, Franco-Siamese Boundary.

This race is differentiated from that of the Malay Peninsula by the absence of any blackish nape-stripe; otherwise the coloration of the two is similar. The bony orbit appears to be a trifle larger.

*Measurements*.—Head and body, 438 mm.; tail, 70; hind foot, 110; ear, 35.5. Skull: greatest length, 89.5; greatest breadth, 43.

This form was first erected by Gray (P. Z. S. 1861, p. 138) upon material consisting of seven specimens from Cambodia collected by Mouhot. In the course of his description, he states that "a specimen of the species has been in the Museum as above named for many years: it is said to have come from Singapore; but that probably was only the port of transit." This remark can hardly be regarded as the citation of the type, so that the name *affinis* must be confined to the Indo-Chinese form, for it was further a *nomen nudum* until rendered available for use through being applied with description to the Cambodian animals specified therein.

In 1903, Mr. Bonhote (Ann. & Mag. Nat. Hist.) took the view that *affinis* should be referred to the Malayan animal with the specimen of dubious provenance for type, and redescribed a Cochin-Chinese example under the name *T. k. pierreii*. Later, however (P. Z. S. 1907, p. 11), he found reason to change his opinion, and accepted the name of *affinis* for the Indo-Chinese form.

Even the strict systematist, who holds that the first locality cited is that of the type-specimen, must, I think, accept this view, for the title of the paper in which this species is dealt with is "List of Mammals, etc., collected in Cambodia" and, unless otherwise specially excepted in the text, this locality has priority.

In the Brit. Mus. Cat. Ungulates, vol. iv., Lydekker appears to have overlooked the above facts. The unfortunate term "Lower Siam," applied by several describers of species to the northern half of the Malay Peninsula, *i. e.*, Peninsular Siam, has been the cause of much confusion to others who do not use their

atlases sufficiently \*. Thus, Siracha in S.E. Siam, about 40 miles S.E. of Bangkok, is regarded by Lydekker as practically the type-locality of *T. rarus* Miller (= *T. k. affinis* of Lydekker), which came from Trang in Peninsular Siam, about 400 miles south of Bangkok. The outcome is that *T. k. affinis* is given a distribution from Pahang, Malay States, north to Moulmein in Tenasserim, and thence east to Annam, while *T. k. pierrei* Bonhote (= *T. k. affinis* Gray), which name is accepted by Lydekker, is supposed to extend from Lower Cochin-China west to Siam, thus making two subspecies of the same species exist side by side; whereas inter se *rarus* and *affinis* are two well-defined forms, the one spreading from the middle of the Malay Peninsula and the other from Cambodia, the line where they intergrade being still not clearly known.

In similar fashion Lydekker extends *T. javanicus napu* F. Cuv., of Sumatra, up the Malay Peninsula, from Selangor to Southern Tenasserim, and at the same time places in an intermediate position, Trang ranging southward, *T. j. canescens* Miller. While it is highly probable that the latter name will have to be regarded as synonym of the other, yet while the subspecies are excepted the allocation of specimens to them results in an impossible distribution.

#### 45. *SUS CRISTATUS*, subsp.

*Sus* — (?) Gray, P. Z. S. 1861, p. 139.

*Sus cristatus* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 535 (1904).

An immature female, with posterior molars not up and one milk-incisor still present, was shot on Koh Chang Id.

The strongly-marked crest is tipped throughout with light isabelline, and there is a patch of clearly defined white bristles at the angles of the mouth, a number are scattered over the lower abdomen and in fewer quantity on the throat and chest. The prevailing colour is black, clear on the cheeks and shoulders, fore and lower hind limbs; but the forehead, sides, and thighs are annuated with buffy and white. The greater part of the inner surface of the ears is covered with white hairs, and the fringe along the edge is very short.

\* To avoid similar confusion in future, I suggest the use of the following divisions for Siam:—

- (i.) Northern Siam: the mountainous country north of the Thoungyin River-mouth and the great bend of the Mekawng (about Lat. 18° N.)
- (ii.) Central Siam: the great plain, south of (i.), watered by the Menam and its tributaries and by the Bangpakong and the lower Mekawng and Petchaburi Rivers.
- (iii.) Western Siam: the hill country between the Menam plain and the Tenasserim Boundary, south to about Lat. 12° N.
- (iv.) Peninsular Siam: the Malay Peninsula south of (iii.) to the Protected Malay States.
- (v.) Eastern Siam: the "Korat Plateau" east of (ii.), drained by the tributaries of the Mekawng.
- (vi.) South-eastern Siam: the coastal country south of the Bangpakong basin and the Battambang-Cambodian frontier, drained by streams running into the Gulf.

(For fuller details see Journ. Nat. Hist. Soc. Siam, vol. i. part 4, 1915.)

The skull is remarkable for the antero-posterior length of the bullæ, which in this dimension are larger than those of full-grown animals from Peninsular Siam and about twice the length of those of *Sus jubatulus*, a small race occurring on Terutau Island, off the west coast of that region and occupying a position with regard to it very similar to that of Koh Chang in respect of S.E. Siam. It is possible therefore that, when better material is available, this pig may prove to be a representative of a local race.

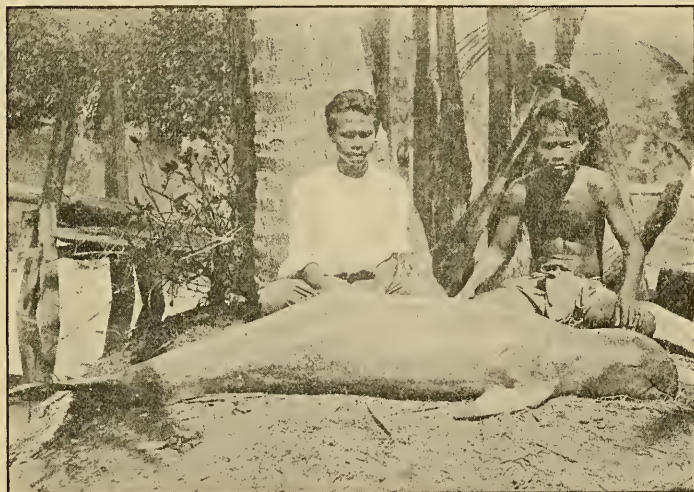
Though Blyth, in 1875 (Cat. Mamm. & Birds of Burma, p. 43), drew attention to differences in the Tenasserim animals, the common wild pigs throughout Eastern Asia were all regarded as typical *cristatus* until Miller separated the Peninsular Siamese and Tenasserim animal under the name of *S. jubatus* (Proc. U.S. Nat. Mus. xxx. p. 745, 1906), and it is this, or some allied form, that occurs in Southern Indo-China.

Head and body, 1110 mm.; tail, 190; height at shoulder, 610. Skull: greatest median length, 265; greatest breadth, 116; antero-posterior length of bullæ, 26.

#### 46. ORCELLA BREVIROSTRIS (Owen). (Text-fig. 2.)

*Orcella brevirostris* de Pousargues, Mission Pavie, Indo-Chine, Études Diverses, iii. p. 546 (1904).

Text-figure 2.



Photograph of Porpoise (*Orcella brevirostris*) at Klong Yai, S.E. Siam.

A male example of this cetacean was brought to me by fishermen at Klong Yai on 6th December, 1914, but my preservatives being then nearly exhausted I only kept the skull.

Except that it had the profile of the head considerably less

swollen and convex, while the anterior edge of the pectoral fins was more curved and a neck more evident, it closely resembled the figure given by Anderson (Zool. Res. pl. xxv. fig. 4).

Colour slaty-leadен throughout; greatest length, 3660 mm. (7 ft.).

Skull : greatest length (condylo-basal), 286 mm.; basal length, 260; palatal length, 141; greatest breadth, 202; rostral breadth, 77. Length of mandible, 225. The skull is asymmetrical, particularly in the region of the nasal openings; but asymmetry seems to be the rule with this species.

Teeth,  $\begin{matrix} \text{R.16} & \text{L.15} \\ \text{R.12} & \text{L.13} \end{matrix}$ : all are worn down to mere flattened stumps and there are no signs of premaxillary teeth.

De Ponsargues (*loc. cit. supra*) records a specimen from the Mekong River.

This species is very common along the Chantabun coast.

While sailing from Klong Yai to Klong Menao we saw, late in the afternoon of December 7th, numbers of white cetaceans between ourselves and the shore. They presented a most brilliant appearance with the low sun shining on them, but none came sufficiently near for details to be observed. They were, however, of large size, as big as the present species, and I imagine them to have been examples of *Sotalia sinensis* Flower.

#### EXPLANATION OF THE PLATE.

Map of the coast and islands of South-East Siam, showing the places at which collections were made by Mr. C. Boden Kloss.



TABLES OF MEASUREMENTS (in millimetres).—Measurements of hind feet are always exclusive of claws.

*Hylobates pileatus* (p. 29).

Locality.	Sex.	Head and body.	Hind foot.	Skull.				Collector's No.	Remarks.
				Greatest length.	Basal length.	Zygomatic breadth.	Maxillary tooth-row, excluding incisors.		
Klong Menao, S.E. Siam	♂	460	150	101	69	69	30	1859	Aged.
"	♂	465	150	102	73	69	33.5	1865	Adult.
"	♂	472	153	105.5	75	72.5	31.5	1874	Aged.
Lem Ngop,	♂	485	153	105.5	73	73	30.5	1894	"
Klong Menao,	♂	485	145	102	71	72.5	32	1901	"
Lem Ngop,	♀	472	153	101	71	69.5	32	1889	"
"	♀	465	147	101.5	71	67	31	1902	Adult.

*Macaca irus* (p. 31), *Presbytis germani* (p. 32), *P. g. mandibularis* (p. 32).

Species and Locality.	Sex.	Total length.	Tail from angle with back.	Nose to vent.	Tail from vent to tip.	Hind foot.	Skull.				No.	Remarks.
							Greatest length.	Basal length.	Zygomatic breadth.	Maxillary tooth-row, excluding incisors.		
<i>Macaca irus.</i>												
Koh Kut Id., S.E. Siam	♂	902	483	...	...	118	112	80	77	40	1688	Adult.
"	♂	935	485	485	...	118	111	80	78	39	1757	Aged.
"	♂	940	...	455	485	123	108.5	75	77.5	37	1722	Adult.
"	♀	842	...	410	432	109	100	69	69.5	32.5	1723	Aged.
"	♀	844	452	...	...	108	93	62.5	67.5	32	1689	"
<i>Presbytis germani.</i>												
Klong Yai, S.E. Siam	♂	1300	755	...	...	160	106	80	78	36	1839	Adult.
<i>P. g. mandibularis.</i>												
Koh Chang Id., S.E. Siam	♂	1260	720	560	...	160	99.5	72.5	77	35	1433	Aged.
"	♀	...	...	590	800	156	100	72	75	32.5	1483	"
"	♀	1305	795	560	...	152	97	71	72	32.5	1435	Adult.
"	♀	1285	780	530	...	157	93	69	74.5	33	1434	"

*Tupaia concolor* (p. 36), *T. c. sinus* (p. 36)

Species and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.								No.	Remarks.
					Greatest length.	Basal length.	Palatal length.	Upper molar row.	Tip of pre-maxillaries to lachrymal notch.	Rostral breadth at diastema.	Inter-orbital breadth.	Zygo-matic breadth.		
<i>Tupaia concolor.</i>														
Ok Yam, Franco-Siamese Boundary, on coast.	♀	195	184	41	49.7	42.3	24.8	14.2	19	6.8	14.1	25.5	1803	Adult.
"	♂	192	180	41.5	52.3	44.6	27	15.1	20	7.3	14.5	27	1812	Aged.
Klong Yai, S.E. Siam	♂	195	195	45	53	46.8	28.1	16.3	21	6.9	14.9	27.1	1824	Adult.
"	♀	200	200	45	54.5	47.6	28.6	16.2	21.8	8	15	28	1825	Aged.
"	♀	195	197	45	53	46	27.5	16.1	20.4	7	14.2	26.1	1826	Adult.
"	♂	193	198	44.5	53.4	46.8	28	15.4	21	7.2	14.9	27	1828	"
"	♀	191	200	...	52	45.4	27	16	20	7	13.8	25.8	1840	"
"	♀	195	170	46.5	52.3	45.5	28.5	16.1	22.2	7.4	14.2	26.9	1841	Aged.
Klong Menao, S.E. Siam	♂	189	180	45.5	51.3	44.7	27.7	16	22.3	7.2	15	26.5	1876	Adult.
"	♂	185	185	45	52.5	44.8	27.3	15.8	22.2	7.2	14.5	26.6	1888	"
<i>T. c. sinus.</i>														
Koh Chang Id., S.E. Siam.	♂	187	173	44	53.3	47	28.3	16	21.7	7.0	14.8	26.8	1402	Adult.
"	♀	185	165	42.5	49.8	43.3	26.2	15.2	21.7	6.7	13.6	24	1403	"
"	♂	180	170	42.5	50.3	43.3	26.8	15.3	22	6.9	14	25	1419	"
"	♀	180	171	41	50.5	43.7	27	15.2	21.8	7.3	14.8	25.2	1420	"
"	♂	183	167	43	51	44	27.2	15.2	22.2	7.0	14	25	1422	"
"	♀	176	168	43	50	43.4	26.9	15.9	22	6.9	13.9	24.1	1506	"

Type.

Locality,	Sex.	Head and body.	Tail.	Hind foot.	Skull.							No.	Remarks.	
					Greatest length.	Condylar basal length.	Palatal length.	Upper molar row.	Tip of premaxillaries to lacrymal notch.	Breadth of brain-case.	Inter-orbital breadth.			Greatest breadth.
Klong Menao, S.E., Siam	♂	130	127	30	38.6	...	19.5	12.7	14.7	15	11.4	20	1861	Adult.
"	♀	114	106	27.5	34	31	17.5	11.9	13.0	15.2	10.5	17.1	1862	"
Klong Yai,	♀	118	117	28.5	35	32.2	17.9	12.0	13.8	15.0	10.6	17.1	1862	"

*Itatufa melanopepla leucogenys* (p. 43), *R. m. sinus* (p. 44).

Species and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.								No.	Remarks.
					Greatest length.	Condylar-basal length.	Palatal length.	Dias-tema.	Upper molar row.	Inter-orbital breadth.	Zygomatic breadth.	Median nasal length.		
<i>Ratufa melanopepla leucogengys.</i>														
Lem Ngop, S.E. Siam .....	♀	370	435	79	71	60·5	27	16	14	26·5	46	22	1912	Adult.
" " " " " " .....	♂	360	435	80	73	61	27·7	16	14·2	29·5	44	25	1900	"
" " " " " " .....	♂	345	450	79	71	55·5	26·3	14·7	14	26·7	44·5	23	1913	"
<i>R. m. sinus.</i>														
Koh Kut Id., S.E. Siam .....	♀	377	425	79	73	61·2	28	16·3	14·2	28·3	46	24·3	1733	Adult.
" " " " " " .....	♀	380	450	79	72	60·7	27·5	15·5	14·2	30	46	25·2	1734	"
" " " " " " .....	♂	370	435	79	71·5	61	27·2	16·2	14	28	44	24	1781	"
" " " " " " .....	♂	360	427	75	72·7	59·5	27	15·5	14	28·2	44·5	24·5	1779	"
" " " " " " .....	♀	355	435	77	71·5	60	27	15·5	14	28	45	25·8	1775	"
" " " " " " .....	♀	355	415	75	71	59·8	27	16	14	28·5	44	24	1774	"

Species and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.							No.	Remarks.	
					Greatest length.	Condylar basal length.	Palatal length.	Diastema.	Upper molar row.	Inter-orbital breadth.	Zygomatic breadth.			Median nasal length.
<i>Sciurus f. cinnamomeus.</i>														
Ok Yam, Franco-Siamese Boundary, on coast.	♂	225	215	51	55	46.5	22.2	12.1	10.3	20.6	34.2	16	1790	Adult.
"	♀	225	210	50.5	55	47	22.2	12.2	10.1	21	33.5	16	1792	Aged.
"	♂	227	218	53	55.6	47	22.3	12.3	10.3	21.5	32.5	16.3	1801	Adult.
Klong Yai, S.E. Siam	♂	230	195	52	56.1	48.2	23.2	12.8	10.3	20.4	34.6	16	1823	"
"	♂	230	220	51.5	55	47	22.1	12.6	10.4	20.1	32.7	15.3	1848	"
Klong Mennaw, S.E. Siam	♂	230	215	55	55.5	48	23.8	12.8	10.6	20.4	32.3	16.7	1858	"
"	♂	225	230	52	55.8	48	24	13	10.3	19.5	33.3	16.5	1883	"
Leu Ngop,	♂	223	202	50.5	53	45.8	22	12	10.3	21.2	33	16.7	1907	Aged.
"	♂	220	220	50.5	54	46.7	23	12.1	10.8	20	33	15.6	1908	Adult.
"	♂	227	...	51.5	54.3	46	22.4	12.2	10.5	19.9	32.5	15.8	1910	"
<i>S. f. frandseni.</i>														
Koh Chang Id., S.E. Siam	♂	220	210	50	54	46.6	23	12.1	10.4	18.8	32.2	16.2	1450	Adult.
"	♀	220	...	51	54.3	46	22.5	12.2	10	19.8	32	16	1461	"
"	♂	221	186	49	52.6	45	22	12	10.3	18.4	31.5	15.7	1462	"
"	♀	225	205	50.5	55	46.4	22	12.2	10	20	32.8	15.3	1467	"
"	♂	222	200	49.5	56	47	23	12.8	10.4	20.3	33	17	1470	"
"	♂	231	214	51	56.3	47	23	12.9	10.5	19	32	16.6	1486	"
"	♂	233	212	52	56	47.9	23	13	10.3	19.3	32	16.5	1487	Aged.
"	♂	235	215	53	57	48	23.5	12.9	10.9	20	33.1	16.9	1502	Adult.
"	♂	223	204	51	56	46.8	22.5	12.8	10.3	20.5	33	16.7	1504	"
"	♀	217	205	50	...	46	22.2	12.4	10.5	19.2	32.3	...	1505	"
<i>Sciurus albicincti.</i>														
Koh Kut Id., S.E. Siam	♂	230	210	53	57	49	24.3	13	10.8	20	33	16.3	1705	Adult.
"	♀	230	...	52	56.3	47.7	23.7	13	11	20	32.8	17.7	1706	Aged.
"	♂	224	210	51	55	47	23	12.7	10.8	19.4	32	14	1724	Adult.
"	♂	233	207	52	55	47	23.5	12.8	10.8	19.3	33	16.3	1725	"
"	♂	240	210	51.5	55.6	48	23	13	10.3	20	32	16.8	1728	Aged.
"	♂	222	196	51	55	47.8	24	12.6	11	19.6	32.6	15	1730	Adult.
"	♂	227	195	49	55	47.3	23	12.8	10.9	19.4	33	15.5	1735	Aged.
"	♂	230	210	51	55.3	47.8	23.2	12.4	11.2	20	32.7	16	1770	Adult.
"	♂	230	210	51	56	47.3	23.2	12.2	10.3	21	34.1	17	1778	"
"	♂	227	210	52	55	47.1	23.2	13	10.5	19.8	33	16.7	1785	"



Species and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.							No.	Remarks.	
					Greatest length.	Condylor-basal length.	Palatal length.	Diastema.	Upper molar row.	Inter-orbital breadth.	Zygomatic breadth.			Median nasal length.
<i>Menekes berdmorei mouhotii.</i>														
Ok Yam, Franco-Siamese boundary, on coast	♀	215	150	45	...	...	...	...	9.8	13.8	28	17	1795	Aged.
" " "	♀	190	140	42	53.3	44.5	25	14.4	10.4	13.8	28.8	17	1811	"
" " "	♀	200	...	43	53.7	45.2	25	15	10.3	13.2	28.8	16.7	1816	"
Klong Yai, S.E. Siam	♂	203	152	45	50.3	43.8	23.3	13	10.2	13.0	27	...	1821	Adult.
" " "	♂	190	...	43	50.7	...	24.1	13.8	10	12.8	26.8	16.3	1838	"
" " "	♀	198	137	43.5	51	44	24.6	14	10	12.8	28	15	1842	"
" " "	♀	186	150	42	...	43	23.5	13.5	10.3	13	...	14.6	1844	"
Klong Manaw, S.E. Siam.	♂	205	...	42	52	44	23.5	13.7	9.7	13.3	27.5	15	1897	"
Lem Ngop,	♂	197	127	41	51.3	44	24	14	9.7	12.1	27	14.2	1898	Aged.
" " "	♂	202	138	42	51.2	44	23	13.8	10	13	28.5	14.5	1905	Adult.
<i>M. b. umbrosus.</i>														
Koh Chang Id., S.E. Siam.	♂	193	127	41	50.7	43	23.2	13	10.6	13	26.6	14.2	1446	Adult.
" " "	♂	203	...	41	52.2	44.1	23	13.7	10.7	13	27.5	16.4	1448	Aged.
" " "	♂	193	132	41	50.7	43.2	23.5	13	10.4	12	26.2	15.5	1449	Adult.
" " "	♂	187	145	43	48.2	42.2	22.6	12.4	10.2	12.8	26.5	14	1460	"
" " "	♀	191	146	41	50.0	42.5	24	13	10.5	13	25.5	16	1488	"
" " "	♀	180	...	40.5	...	...	24	13	10.3	13	25.5	14.7	1482	"
<i>M. b. rufescens.</i>														
Koh Kut Id., S.E. Siam	♂	195	127	41	51	44	24	13.2	10.6	13	27.2	16	1685	Adult.
" " "	♂	205	...	43.5	54	46.3	24.6	13.8	10.6	14.3	29	15.1	1720	Aged.
" " "	♂	202	...	41	52	45	25.6	14.8	10.2	13.5	28	15	1737	"
" " "	♂	195	130	39	51.4	45	25	14	9.8	14.4	27.5	15.1	1739	"
" " "	♀	205	120	42	52	45.2	25	14	11	13.2	28	14.7	1740	"
" " "	♀	217	130	43	55	47	26	14.8	11	14	29	16.7	1759	"
" " "	♀	202	118	40.5	51	43.8	24.6	13.2	11.2	13.1	27.2	14.3	1761	"
" " "	♂	206	129	38	51.7	44.7	24.6	13.6	10.9	13	27	16.3	1771	Aged.
" " "	♀	206	127	40	51.2	44	24	12.7	11.5	12.7	27.3	14	1772	Adult.
" " "	♀	194	141	41	51	44.1	25	13	11	13.5	27.2	14.7	1773	"

*Taniops rodolphi* (p. 47).

Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.						No.	Remarks.		
					Greatest length.	condylor-basal length.	Palatal length.	Diastema.	Upper molar row.	Inter-orbital breadth.			Zygomatic breadth.	Median nasal length.
Lem Ngop, S.E. Siam	♂	118	102	29	32.6	26.3	13	7	5.5	12.5	21.0	8.5	1903	Adult.
"	♀	115	120	29.5	32.0	26.6	12.2	6.8	5.5	11.9	20.1	8.0	1904	"

*Epimys jerdoni marinus* (p. 50).

Locality.	Sex.	Head and body.	Tail.	Hind-foot.	Skull.						No.	Remarks.		
					Greatest length.	Condylor-basal length.	Diastema.	Upper molar row.	Palatal foramina.	Median nasal length.			Combined nasal breadth.	Zygomatic breadth.
Koh Chang Id., S.E. Siam.....	♂	144	156	26.5	37.0	30.4	9.2	6.1	6.2	13.4	4.1	16.3	1414	Adult.
"	"	152	168	28	37.9	31.8	9.8	6.0	6.0	14.0	4.5	17.2	1452	Aged.
"	"	150	170	26.5	37.9	31.8	9.7	6.1	6.7	13.5	4.3	17.0	1455	Adult.
"	"	150	...	27	37.6	32.0	9.9	6.1	7.0	13.7	4.3	16.8	1497	Aged.
"	"	141	173	26	38.2	32.0	10.1	6.0	6.0	14.8	4.4	16.6	1499	"
"	"	145	...	26	36.5	30.4	9.6	5.8	6.1	13.3	4.2	16.4	1677	"
Kot Kut Id.,	♂	147	184	28.5	37.2	31.5	9.9	6.1	6.5	13.4	4.3	16.2	1702	"
"	"	147	179	27.5	36.0	30.2	9.9	5.9	6.7	12.4	4.1	...	1704	"
"	"	146	170	27	36.4	30.3	9.2	5.9	6.1	13.0	4.0	16.3	1716	Adult.
"	"	146	156	28	36.4	31.0	9.6	6.0	6.7	13.3	4.2	16.0	1784	Aged.

*Epinys swirfer* subsp.

Race and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.							No.	Remarks.	
					Greatest length.	Condylar basal length.	Diastema.	Upper molar row.	Length palatal foramina.	Median nasal length.	Breadth combined nasals.			Zygomatic breadth.
<i>Epinys swirfer finis</i> (p. 51).														
Ok Yam, S.E. Siam.....	♀	173	179	39	44.2	36.5	10.9	6.9	6.2	17.0	4.5	20	1799	Adult.
Klong Yai, ".....	♀	178	187	37	44.2	37.5	12.4	6.9	6.0	16.8	4.7	20.3	1829	Aged.
Klong Menao, S.E. Siam .....	♂	210	186	40	48.0	41.1	13.6	7.0	6.8	19.0	5.1	20.3	1864	"
" ".....	♀	174	183	36	...	37.8	12.7	6.4	6.0	...	5.2	20	1873	Adult.
" ".....	♂	190	193	39	47	38.7	12.5	7.0	6.2	18.3	5.0	20	1885	Aged.
<i>Epinys swirfer changensis</i> (p. 52).														
Koh Chang Id., S.E. Siam.....	♂	182	178	37	44.3	36.5	11.7	6.9	6.2	17.0	4.8	20.1	1417	Adult.
" ".....	♂	191	175	37.5	45.5	38.6	12.8	6.6	6.5	18.2	5.9	20	1427	Aged.
" ".....	♂	185	170	35.5	45.0	37.4	12.4	7.1	6.3	17.2	5.1	20	1428	Adult.
" ".....	♂	177	175	38	44.3	37.4	12.4	6.4	6.0	17.4	4.9	20.3	1458	Aged.
" ".....	♂	172	172	38.5	45	38.2	12.2	7.0	6.7	17.8	5.3	20.9	1492	" Type.
<i>Epinys swirfer kutensis</i> (p. 52).														
Koh Kut Id., S.E. Siam.....	♂	178	167	35	44	37	12	7.0	6.0	18.2	4.7	20	1695	Aged.
" ".....	♂	194	178	38	45.9	38.4	12.9	7.1	6.3	18.5	4.9	21.3	1710	"
" ".....	♂	188	181	38	46	38.2	12.6	7.0	6.7	18.0	5.2	20.6	1712	"
" ".....	♂	185	171	38.5	45.5	38.7	13.0	7.0	6.2	18.5	5.5	20.7	1750	"
" ".....	♂	180	168	35	43.0	36.5	12.1	6.9	6.1	17.4	4.5	20	1763	"
<i>Epinys swirfer pelagius</i> (p. 53).														
Koh Raug Id., S.E. Siam .....	♂	198	185	39.5	47	39	12.9	7.1	6.1	18.7	5.0	21	1642	Aged.
" ".....	♂	200	179	40	47.8	39.8	13.1	7.4	6.5	19.0	5.0	21	1659	Adult.
" ".....	♂	198	179	38.5	46.8	38.5	13.1	7.0	6.2	18.0	5.3	21.6	1660	"
" ".....	♂	192	168	38	46	38.5	12.6	7.1	6.3	18.0	5.2	20.3	1664	Aged.
" ".....	♀	187	163	36	44.2	37	12.2	6.7	6.1	17.6	4.9	20.6	1665	Adult.

Race and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.						No.	Remarks.		
					Greatest length.	Condylor-basal length.	Diastema.	Upper molar row.	Length palatal foramina.	Median nasal length.			Breadth combined nasals.	Zygomatic breadth.
<i>Epimys surifer connectens</i> (p. 53).														
Koh Mak Id, S.E. Siam	♂	197	179	39	46.4	39.2	13	7.2	6.5	18.6	5.5	21.1	1603	Adult.
"	♀	198	169	38.5	45	39.1	13	7.0	7.0	17.6	5.7	21.5	1610	"
"	♀	195	170	36	46	39.6	13.2	7.1	6.9	19.3	5.5	22.0	1612	Aged.
"	♀	200	163	37	46.7	39.1	13	7.0	7.1	19.6	5.8	22.0	1613	Adult.
"	♂	191	190	38	47	39.4	13.6	6.9	6.7	19.8	5.4	22.0	1632	"
<i>Epimys surifer eclipsis</i> (p. 53).														
Koh Kra, S.E. Siam	♀	201	197	39	46	39	13	6.9	7.0	18.8	5.0	21	1543	Adult.
"	♀	200	180	37.5	45.1	38.6	12.8	6.9	7.1	18.9	4.9	21.2	1559	"
"	♀	191	177	39	45.1	38.9	12.9	7.0	7.2	18.0	4.9	20.8	1561	"
"	♂	194	187	39	46	39.3	13	7.2	7.0	19.0	5.0	20.5	1564	"
"	♂	196	176	41	46.7	39.8	13.3	7.0	6.2	18.8	5.0	20.4	1540	"
<i>Epimys surifer tenebrosus</i> (p. 54).														
Koh Klum, S.E. Siam	♂	196	176	41	46.7	39.8	13.3	7.0	6.2	18.8	5.0	20.4	1586	Aged.
"	♂	202	180	39	47.2	39.6	13.2	6.9	6.3	19.3	5.2	20	1587	"
"	♂	197	177	40	47.9	40	13.7	7.0	6.2	19.1	5.1	20.6	1588	Adult.
"	♀	192	169	38	47	39.3	13.3	6.9	6.0	19.2	5.1	20	1591	Aged.
"	♀	191	177	37.5	46.6	39	13	7	6.2	18.8	4.9	21	1593	Adult.



Subspecies and Locality.	Sex.	Head and body.	Tail.	Hind foot.	Skull.								No.	Remarks.
					Greatest length.	Condylol-basal length.	Diastema.	Upper molar row.	Length palatal foramina.	Median nasal length.	Breadth combined nasal.	Zygomatic breadth.		
<i>E. rattus</i> , subsp. (p. 55).														
Klong Yai, S.E. Siam	♂	177	196	36	43.2	38.0	12.0	7.1	8.2	15.8	4.7	20.0	1833	Adult.
"	♂	160	160	31	41.5	35.8	10.9	7.0	7.3	14.8	4.2	19.1	1834	"
"	♂	173	173	32	42.8	37.0	11.2	6.8	8.0	15.2	4.4	19.1	1843	"
"	♂	164	164	33	42.1	36.0	11.2	7.7	8.0	15.0	4.7	20.0	1844	Aged.
"	♂	170	177	33	42.0	37.7	11.8	7.5	8.0	14.4	4.4	19.5	1855	"
Koh Chang Id., "	♂	166	185	31	40.0	35.5	10.7	7.2	7.3	14.8	4.7	14.13	1843	Adult.
Koh Melsi West Id., S.E. Siam	♂	170	184	33.5	42.4	37.5	12.0	7.2	8.5	16.1	4.8	20.2	1531	Aged.
"	♂	179	182	32	42.0	37.6	11.3	7.2	8.4	16.1	4.9	20.1	1533	"
Koh Melsi East Id., "	♂	173	182	35.5	41.7	37.0	11.6	7.5	8.0	15.3	4.5	19.7	1515	"
"	♂	167	171	31	41.4	36.0	11.0	7.0	8.0	15.4	4.7	19.9	1519	"
<i>E. rattus rangensis</i> (p. 56).														
Koh Rang Id., S.E. Siam	♀	186	194	35.5	41.0	37.3	12.0	7.0	7.7	14.7	4.7	20.5	1653	Aged.
"	♀	180	184	35	41.2	37.5	11.5	7.0	7.2	14.3	5.0	19.5	1668	Adult.
"	♀	202	210	36	42.5	39.3	12.8	7.0	7.7	15.0	5.2	21.6	1669	Aged.
"	♀	179	186	30.5	40.2	36.7	11.9	6.8	7.1	13.6	4.8	19.8	1670	Adult.
<i>E. rattus klameusis</i> (p. 56).														
Koh Khum Id., S.E. Siam	♂	190	236	37	43.5	38.6	11.5	8.0	7.6	17.1	4.6	21.1	1591	Adult.
"	♂	186	233	36.5	44.1	39.1	12.0	8.1	7.9	17.4	4.7	21.5	1595	"
"	♂	191	235	37	45.4	40.2	12.7	8.5	7.7	17.6	5.0	22.4	1596	Aged.
"	♂	197	230	38	...	...	12.4	8.7	7.8	18.0	5.2	22.4	1598	"
<i>E. rattus makensis</i> (p. 56).														
Koh Mak Id., S.E. Siam	♂	191	222	36	44.2	39.5	12.2	7.1	8.3	17.0	5.3	22.1	1615	Adult.
"	♂	205	210	38	45.5	41.0	12.7	7.3	9.0	17.9	5.1	22.2	1616	"
"	♂	202	213	38	45.5	40.0	12.3	7.6	8.5	17.5	4.9	23.0	1618	"
"	♂	202	205	36	45.0	40.1	12.4	7.8	9.5	16.3	5.0	23.1	1622	"
"	♂	197	217	35	47.0	41.1	13.0	8.1	9.7	17.8	5.2	22.8	1639	"
<i>E. rattus kraensis</i> (p. 57).														
Koh Kra Id., S.E. Siam	♂	213	...	38.5	47.3	42.0	13.3	8.6	9.1	17.8	6.0	24.0	1546	Aged.
"	♀	211	228	37	46.6	40.1	12.5	8.1	8.9	17.2	5.3	23.5	1550	Adult.
"	...	215	...	38	47.0	40.4	12.4	8.5	8.9	18.2	5.7	23.0	1558	Aged.
"	♂	191	240	36	45.2	39.2	12.8	7.5	8.6	18.0	5.2	22.0	1573	Adult.
"	♂	218	229	37	46.0	39.3	12.2	8.0	8.6	18.1	...	22.5	1575	"